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NUEXCO

Monthly Report

August 1990 Number 264

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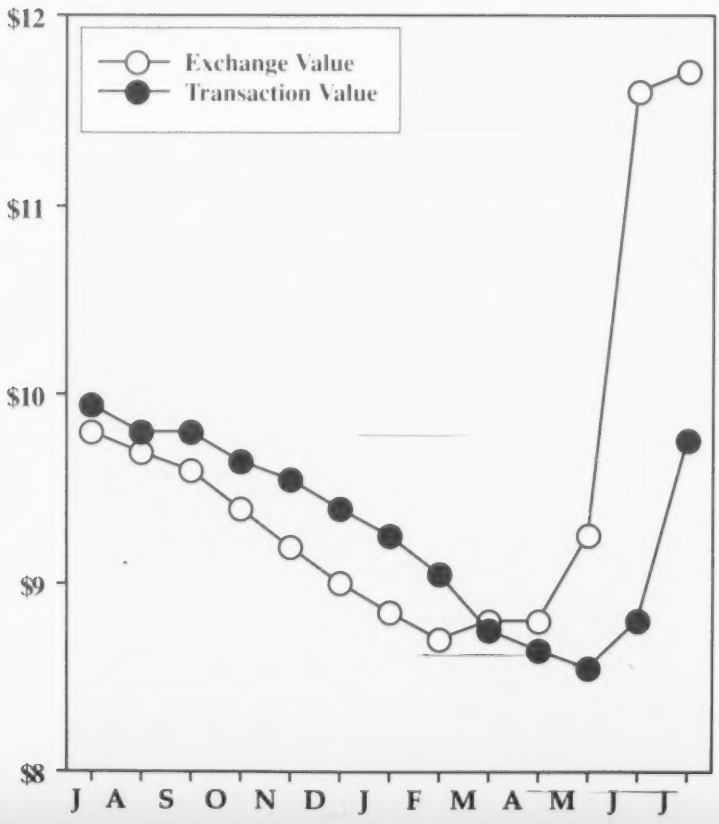

NUEXCO

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Other NUEXCO Publications:
Annual Review;
Uranium Market Study;
International Directory of Nuclear Utilities (IDNU);
International Directory of Uranium Producers (IDUP)

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- **World Enrichment Services Market (1990-2005)**

NUEXCO projects cumulative world enrichment requirements to exceed 285 million SWU through the year 2000. Unfilled requirements, particularly in the USA, will rise in the second half of the 1990s, but the oversupply of enrichment capacity will continue to grow. Suppliers will compete aggressively to capture the available demand.

- **South Africa Update** 27

This update presents some of the developments that occurred during the first half of 1990, including first half 1990 uranium production figures, mining privatization bill progress, and of the status of anti-apartheid sanctions.

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- **US Uranium Exploration and Development Update**

As a result of the US uranium industry's deterioration in the last decade, little exploration and development drilling is taking place. Nevertheless, the continuation of drilling activity provides hope for the industry's eventual recovery.

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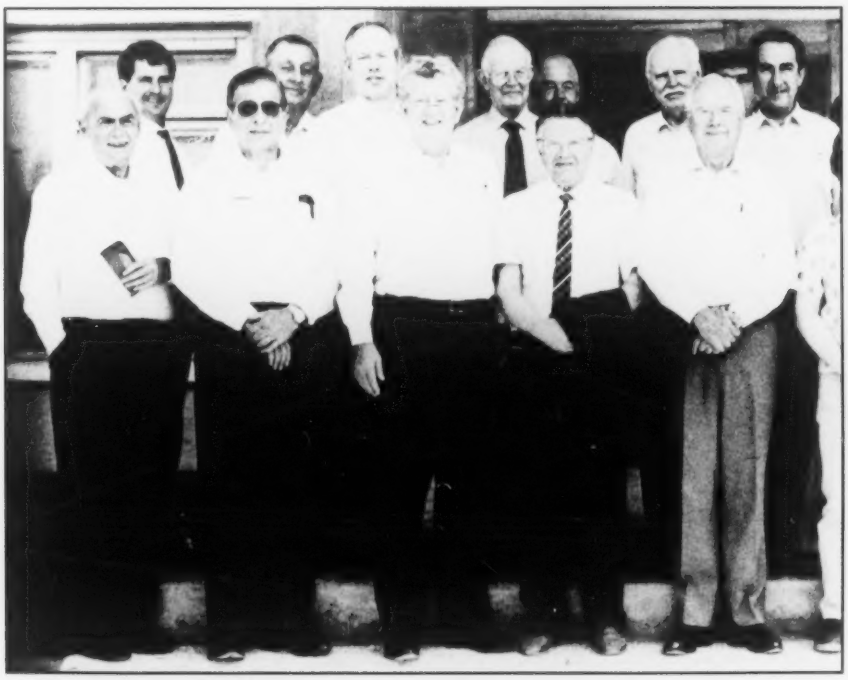
To Our Readers

NUEXCO is pleased to announce that **Melanie R. Bizal** has joined the organization effective July 9, 1990. Melanie holds a MS in Mineral Economics and a BS in Petroleum Engineering from Colorado School of Mines. She joins us from Ensign Oil and Gas where she was responsible for reservoir engineering projects such as development drilling and well enhancement, and secondary and tertiary recovery. She also had responsibility as Ensign's natural gas coordinator. Previous to her work at Ensign, she was a petroleum engineer for Northern Pump Company.

Melanie will remain in Denver and work for NUEXCO Information Services as a Uranium Supply Analyst.



NUEXCO's International Advisory Committee recently met in Finland and the Soviet Union. One of the most interesting examples of their hosts' hospitality was a tour of a Soviet enrichment facility. The photo shows members of the committee and some of their hosts outside the administrative building of the Soviet enrichment facility at Angarsk. The tour also included a fabrication plant and other fuel cycle facilities.

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MARKET REVIEW

MARKET VALUES SUMMARY
July 31, 1990

NUEXCO Market Values	This Report July 31, 1990	Last Report June 30, 1990	12 Months Ago July 31, 1989
EXCHANGE VALUE [1]	**$11.70**/lb equivalent U_3O_8	$11.60	$9.80
UF_6 VALUE [2]	**$32.50**/kg U as UF_6	$32.00	$30.00
LOAN RATE [3]	**3.5%**/annum	3.5%	3.5%
CONVERSION VALUE [4]	**$1.45**/lb U as UF_6	$1.45	$1.95
SWU VALUE [5] **(0.3 w/o tails assay)**	**$50**/SWU	$50	$66
TRANSACTION VALUE [6]	**$9.75**/lb equivalent U_3O_8	$8.80	$9.95
Transactions	**35**	38	19
Months	**3**	3	3
Millions of Pounds	**9.1**	11.3	3.4

DEFINITIONS

[1] The **Exchange Value** is NUEXCO's judgment of the price at which transactions for significant quantities of natural uranium concentrates could be concluded as of the date indicated.

[2] The **UF_6 Value** is NUEXCO's judgment of the price at which spot and near-term transactions for significant quantities of natural uranium hexafluoride could be concluded as of the date indicated.

[3] The **Loan Rate** is NUEXCO's judgment of the annual interest rate at which uranium loans could be concluded as of the date indicated.

[4] The **Conversion Value** is NUEXCO's judgment of the price at which spot and near-term transactions for significant quantities of conversion services could be concluded in the secondary market as of the date indicated.

[5] The **SWU Value** is NUEXCO's judgment of the price at which spot and near-term transactions for significant quantities of enrichment services could be concluded as of the date indicated.

[6] The **Transaction Value** is a weighted average price of recent natural uranium sales transactions. The calculation is based on prices paid in:

a. Transactions closed within the previous three month period for which delivery is scheduled within one year of the transaction date;
b. At least ten transactions;
c. Transactions involving a sum total of at least 2 million pounds equivalent U_3O_8.

DERIVATIONS AND COMMENTS

- All **Market Values** are expressed in terms of US$.
- All **Market Values** are based on:
  - Data from recently completed transactions.
  - Data from pending transactions.
  - Firm bids to buy or borrow, and firm offers to sell or lend.
  - Prices purchasers or rates borrowers have expressed a willingness to pay, but for which NUEXCO is not aware of firm bids to buy or borrow and prices sellers or rates lenders have expressed a willingness to accept, but for which NUEXCO is not aware of firm offers to sell or lend.
- Prices associated with deliveries under old or renegotiated contracts or other than arm's-length transactions are not included in the determination of these **Market Values**.
- In the determination of prices, NUEXCO does not consider charges for transportation other than that customarily provided by suppliers.
- The prices of services or materials delivered under long-term contracts with primary suppliers are not considered in the determination of the listed values.
- For the **SWU Value**, NUEXCO converts SWU prices at varying tails and product assays to equivalent SWU prices at a tails assay of 0.30 weight percent U^{235} and a product assay of 3.0 weight-percent U^{235}, assuming feed costs corresponding to the NUEXCO **Exchange Value** and **Conversion Value** determined as of the same date.
- In calculating the **Transaction Value**, NUEXCO does not account for the price of uranium delivered in connection with contracts which call for "market price" mechanisms. This exclusion applies particularly to contracts in which delivery prices are expressed as a function of future **Exchange Values** or any other indeterminate variable. Also excluded from the calculation are any other transactions in which the delivery price is defined in such a way that it can not currently be determined.
- The sample time for the **Transaction Value** is extended as necessary to satisfy the minima for the number of transactions and quantity of material. Other currencies are converted to US dollars using conversion rates in effect on or near the transaction date.

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MARKET REVIEW

JULY MARKET REVIEW

(as of July 31, 1990)

OVERVIEW

After June's hectic pace and record price increases, uranium market activity slowed appreciably during July. The Exchange Value and UF_6 Value both increased moderately, to $11.70 per pound U_3O_8 and $32.50 per KgU as UF_6, respectively, as 5.3 million pounds equivalent U_3O_8 changed hands in eleven transactions. The nine near-term and spot concentrates sales involved 2.6 million pounds equivalent U_3O_8. Two UF_6 transactions are also reported—one small spot sale, and one long-term sale for more than two million pounds equivalent U_3O_8. July's transactions bring the year-to-date, near-term uranium sales volume to over 25 million pounds equivalent U_3O_8 (**Table 1**), fast approaching the 1989 record of almost 33 million pounds.

The Loan Rate, Conversion Value, and SWU Value all remain unchanged from their June 30 levels. Three loans for nearly two million pounds equivalent U_3O_8, two conversion sales for over 700 thousand pounds U as UF_6, and two secondary enrichment sales for small quantities of SWU are reported this month.

Table 1
NEAR-TERM URANIUM SALES SUMMARY

	July 1990		Year-to-Date	
	No. of Sales	Volume[1]	No. of Sales	Volume[1]
Concentrates	9	2.6	44	11.6
UF_6	1	<0.1	26	9.4
EUP	0	0.0	9	4.2
Total	**10**	**2.6**	**79**	**25.2**

[1] Million Pounds Equivalent U_3O_8

NATURAL URANIUM AND CONVERSION

Near-term Market Activity

The July 31 **Exchange Value** rose $0.10, to **$11.70** per pound U_3O_8. After June's record percentage price increases, market activity has subsided somewhat. Sales occurring earlier in the month reflected some continued strengthening of prices, while those occurring in the latter half of July tended to cluster around the July 31 Exchange Value, as demand was satisified and seller competition increased. As expected, the May and June price increases have drawn additional supplies into the market. Furthermore, demand has decreased for several reasons—partially because of reduced producer buying activity, partially because of less discretionary buying, and partially due to the closing of 42 near-term natural uranium sales for 10.4 million pounds in May, June, and July.

July's nine near-term concentrates sales totalled 2.6 million pounds U_3O_8. All of the buyers and at least seven of the nine sellers are US-based companies, as US market participants continued to dominate uranium market activity. Unlike June, when producers were the primary buyers, utilities accounted for the preponderance (81%) of July's near-term concentrates purchases.

* * *

The **UF_6 Value** climbed $0.50, to **$32.50** per KgU as UF_6 after a month of little UF_6 market activity; just one spot sale is reported. A US intermediary purchased a small quantity of natural UF_6 from a US seller for spot delivery. In addition, one US utility is evaluating offers for a discretionary purchase of UF_6 for near-term delivery. Increasing supply and lack of demand may inhibit any major price increase.

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Table 2
NEAR-TERM SUPPLY/DEMAND SUMMARY

	Active Supply [1]	Active Demand [1]
• Natural Uranium [2] (thousand lbs equivalent U_3O_8)	5,595	405
• Supply/Demand Ratio:	13.8	
• Loans (thousand lbs equivalent U_3O_8)	8,235	0
• Conversion (thousand lbs U as UF_6)	0	400
• SWU (thousand SWUs)	435	75

[1] Supply and demand tables in the current market data section of this Report provide details for each category.
[2] Includes concentrates and hexafluoride.

The **Transaction Value** increased for the second consecutive month, to **$9.75** per pound U_3O_8, based on 35 transactions involving 9.1 million pounds equivalent U_3O_8 over a three-month period. This $0.95 increase reflects the influence of the higher-priced transactions of the past two months, which now account for over half of the volume included in the weighted-average Transaction Value calculation. Despite this month's increase, the Transaction Value is still almost two dollars below the Exchange Value. This lagging is due to the inordinately large volume and low prices from May's transactions that still qualify for inclusion in the TV calculation. (In fact, even if no August transactions qualified for the August 31 Transaction Value calculation, the routine exclusion of May's transactions would cause the Transaction Value to rise almost one dollar.)

* * *

Active uranium supply moved upward slightly to **5.6** million pounds equivalent U_3O_8, while **active uranium demand** dropped almost 90 percent, to **405** thousand pounds (**Table 2**). The resultant **supply/demand ratio** of **13.8** is the highest such ratio since November 30, 1988. This supply/demand imbalance is a direct result of recent market price increases and the large sales volume over the past five months. In addition, loan supply remains abundant, which effectively adds to the imbalance, and also makes it possible for buyers to defer demand if they desire.

* * *

Long-Term Natural Uranium Market Activity

Only one long-term uranium sale is reported this month. A US utility purchased more than two million pounds equivalent U_3O_8 in the form of UF_6 from an intermediary for delivery beginning in 1991.

* * *

The **Loan Rate** remained at **3.5** percent per annum. Three loans are reported this month. In a departure from traditional roles, the lenders were not utilities, but rather two intermediaries and a producer. The loans involved nearly two million pounds equivalent U_3O_8 for delivery this year and repayments during the period 1990-1995. One of the loans carries a slightly higher interest rate, while the other two occurred at levels near the July 31 Loan Rate. Loan supply remains plentiful with over 8.2 million pounds equivalent U_3O_8 available for loan.

* * *

The **Conversion Value** remained unchanged at **$1.45** per pound U as UF_6. Two US utilities purchased over 700 thousand pounds U as UF_6 for delivery in 1990 and mid-1991. One sale was not an arms-length transaction, while the other occurred at a price level near the July 31 Conversion Value. The conversion market has firmed somewhat in the last couple of months, resisting the downward pressure brought about by the inequality between the UF_6 price level and the sum of the values of its component parts— concentrates and conversion. However, current demand for conversion is thin, and when demand does arise, sufficient supply emerges to satisfy it, even though suppliers are not competing aggressively.

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MARKET REVIEW

ENRICHMENT SERVICES AND ENRICHED URANIUM PRODUCT

The **SWU Value** marked its sixth consecutive month at **$50** per SWU. Intermediaries sold small quantities of SWU to US utilities in the only two SWU transactions reported this month. Both buyers required delivery in less than 180 days, and because of such timing, they were forced to pay prices above the current SWU Value. However, ample SWU supply is still available; furthermore, additional inventory material could enter the market before the end of the year. ■

Table 3
ENRICHMENT PRICES
(July 31, 1990)

Prices	This Month Report 264	Last Month Report 263	12 Months Ago Report 252
NUEXCO SWU Value ($US per SWU)	50	50	66
US DOE SWU prices: ($US per SWU)			
USEC	117.85[1]	117.85[1]	117.00[2]
AFC	153.00[3]	153.00[3]	153.00[3]
Requirements	157.00[3]	157.00[3]	157.00[3]
Incentive Price (IP1)	90.00[4]	90.00[4]	90.00[4]
Calculated worth of enriched UF_6[5]: ($US per KgU as UF_6)			
2.0 w/o U_{235}	225	223	236
2.5 w/o U_{235}	308	306	328
3.0 w/o U_{235}	393	391	422
3.5 w/o U_{235}	480	478	519
4.0 w/o U_{235}	568	565	617
4.5 w/o U_{235}	657	654	717

[1] Effective 10/1/89 to 9/30/90.
[2] Effective 10/1/87 to 9/30/89.
[3] Effective since 10/1/84.
[4] Effective 10/1/86 to 9/30/90, for up to 30% of annual requirements.
[5] Calculated using the NUEXCO Exchange Value, Conversion Value, SWU Value and 0.30 w/o tails assay.

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RECENT TRANSACTIONS

Uranium Sales

NUEXCO Transaction Number	Delivery Period	Approximate Quantity (thousand pounds equivalent U_3O_8)	Price Within Percentage Range[2] of Current Exchange or UF_6 Value	Buyer	Seller	Remarks
4903	1990	301-600	98-102	Utility	Intermediary	
4906	1990	Less Than 50	R[3]	Intermediary	R[3]	UF_6
4910	1990	50-100	98-102	Producer	Producer	
4911	1990	101-300	98-102	Utility	Intermediary	
4912	1990	101-300	90-97	Utility	Intermediary	
4915	1991	101-300	90-97	Intermediary	Intermediary	
4917	1991	301-600	98-102	Utility	Intermediary	
4919	1990	50-100	98-102	Intermediary	R[3]	
4920	1990	301-600	98-102	Utility	R[3]	
4921	1990	101-300	98-102	Utility	Intermediary	
4924	1991-1992	1,001-3,000	R[3]	Utility	Intermediary	UF_6

[1] Transactions listed are not limited to those in which NUEXCO was involved, but also include others of which NUEXCO is aware. NUEXCO may delay reporting some transactions in order to protect proprietary information.

[2] The ranges *Below 90, 90-97, 98-102, 102-110, Above 110,* represent percentages (rounded to whole numbers) of the appropriate current Exchange Value or UF_6 Value. The endpoints of each range are included within that range.

[3] The notation **R** means that NUEXCO either does not know, or that NUEXCO has restricted that information to protect client or source confidentiality.

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MARKET REVIEW

RECENT TRANSACTIONS

Natural Uranium Loans

NUEXCO Transaction Number	Delivery Period	Approximate Quantity (thousand pounds equivalent U_3O_8)	Price Within Percentage Range [2] of Current Loan Rate	Borrower	Lender	Remarks
4904	1990	301-600	Over 110	R [3]	Intermediary	
4914	1990	301-600	98-102	Intermediary	Intermediary	
4918	1990	601-1,000	98-102	Producer	Producer	

Conversion Sales

NUEXCO Transaction Number	Delivery Period	Approximate Quantity (thousand pounds of U equivalent)	Price Within Percentage Range [2] of Current Conversion Value	Buyer	Seller	Remarks
4905	1990	50-100	R [3]	Utility	Utility	
4913	1991	601-1,000	98-102	Utility	Intermediary	

Enrichment Sales

NUEXCO Transaction Number	Delivery Period	Approximate Quantity [4] (thousand SWU)	Price Within Percentage Range [2] of Current SWU Value [5]	Buyer	Seller	Remarks
4922	1990	Less Than 50	Over 110	Utility	Intermediary	
4923	1990	Less Than 50	103-110	Utility	Intermediary	

[1] Transactions listed are not limited to those in which NUEXCO was involved, but also include others of which NUEXCO is aware. NUEXCO may delay reporting some transactions in order to protect proprietary information.

[2] The ranges *Below 90, 90-97, 98-102, 102-110, Above 110*, represent percentages (rounded to whole numbers) of the appropriate current Market Value. The endpoints of each range are included within that range.

[3] The notation **R** means that NUEXCO either does not know, or that NUEXCO has restricted that information to protect client or source confidentiality.

[4] If tails assay is unknown or unspecified, NUEXCO's calculation of SWU quantity assumes 0.30 w/o tails assay.

[5] Prices are usually normalized to 0.30% tails assay. When prices and SWU values are expressed as discounts from a reference price (e.g., X dollars less than DOE's USEC base price at time of delivery), the percentage price range is based on the discounted prices, not on the reference price.

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Uranium Supply

(July 31, 1990)

NUEXCO Project Number	Quantity (Thousand Pounds equivalent U_3O_8) Spot or Near-term [1]	Intermediate or Long-term [2]	Delivery Period	Remarks
Available for Sale				
ACTIVE				
89-1180*	350	--	1990	
90-1078A	2,175	2,175 per year	1991-1993	UF_6e
90-7001	3,000	3,000 per year	1991-1995	
90-1183*	70	--	1990-1991	
Total	**5,595**			
INACTIVE	**500**			
Available for Loan				
ACTIVE				
88-1182	4,000	--	--	U_3O_8/UF_6
90-1016	300	--	--	U_3O_8
90-1033	1,270	--	--	UF_6
90-1108	1,000	--	--	U_3O_8
90-1110	250	--	--	U_3O_8
90-1115	390	--	--	UF_6
90-1173*	500	--	--	U_3O_8
90-1180*	525	--	--	U_3O_8
Total	**8,235**			
INACTIVE	**1,000**			

* New or revised since last month.

[1] For delivery within one year, measured from the date of this Report. This category excludes material deliverable within one year under other than spot or near-term contracts.

[2] For delivery beyond one year, measured from the date of this Report.

Active Projects reclassified as Inactive since last month: *none*
Active Projects removed since last month: *none*.

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MARKET REVIEW

Uranium Demand

(July 31, 1990)

NUEXCO Project Number	Quantity (Thousand Pounds equivalent U_3O_8) Spot or Near-term [1]	Intermediate or Long-term [2]	Delivery Period	Remarks
Inquiries to Purchase:				
ACTIVE				
90-1100A	45	--	1991	UF_6e
90-1171	75	--	1990	U_3O_8/UF_6
90-1177A*	260	--	1991	UF_6e
90-1182*	25	--	1991	
90-1098	--	250 per year	1992-1994	
90-1113	--	800	1991-1995	
90-1155	--	325 per year	1991-1995	
90-1170*	--	290	1992-1996	
Total	**405**			
INACTIVE	**2,080**			
Inquiries to Borrow	*No inquiries to borrow are reported*			

* New or revised since last month.

[1] For delivery within one year, measured from the date of this Report. This category excludes material deliverable within one year under other than spot or near-term contracts.

[2] For delivery beyond one year, measured from the date of this Report.

Active Projects reclassified as Inactive since last month: 90-1126, 90-1138.
Active Projects removed since last month: 90-1146, 90-1149, 90-1151, 90-1154, 90-1156, 90-1161, 90-1163, 90-1166, 90-1167A.

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Conversion Supply and Demand

(July 31, 1990)

NUEXCO Project Number	Quantity (Thousand Pounds U as UF_6) Within 3 Years [1]	Beyond 3 Years [1]	Remarks
Available for Sale	*No offers to sell are reported*		
Inquiries to Purchase			
ACTIVE			
90-1184*	400	--	
Total	**400**		
INACTIVE	*None reported*		

* New or revised since last month.

[1] Measured from the date of this Report.

Active Projects reclassified as Inactive since last month: *none*.
Active Projects removed since last month: 90-1167B, 90-1167C.

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MARKET REVIEW

SWU Supply and Demand

(July 31, 1990)

NUEXCO Project Number	Quantity (Thousand SWUs) Spot or Near-term [1]	Quantity (Thousand SWUs) Intermediate or Long-term [2]	Delivery Period	Remarks
Available for Sale				
ACTIVE				
90-1078B	435	435 per year	1991-1993	UF6e
90-7000	--	1,000	1991- on	
Total	**435**			
INACTIVE	*None reported*			
Inquiries to Purchase				
ACTIVE				
90-1100B	15	--	1991	UF6e
90-1177B	60	--	1991	UF6e
88-1061	--	500	1991-1995	
90-1076	--	350 per year	1992-1998	
90-1094	--	500	1992-2000	
90-1144	--	60 per year	1992-2001	
90-1181*	--	600	1996-2003	UF6e
Total	**75**			
INACTIVE	**1,545**			

* New or revised since last month.

[1] For delivery within one year, measured from the date of this Report. This category excludes SWU deliverable within one year under other than spot or near-term contracts.

[2] For delivery beyond one year, measured from the date of this Report.

Active Projects reclassified as Inactive since last month: *none*

Active Projects removed since last month: 89-1262.

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MARKET VALUES EXPRESSED IN SELECTED CURRENCIES

Exchange Value[1]

Country (currency)	per lb equivalent U3O8 as Concentrates			per kg U as Concentrates		
	This Month (July 31, 1990)	Last Month (June 30, 1990)	12 Months Ago (July 31, 1989)	This Month (July 31, 1990)	Last Month (June 30, 1990)	12 Months Ago (July 31, 1989)
Australia (dollar)	14.78	14.74	13.09	38.42	38.32	34.04
Belgium (franc)	386.27	398.63	387.81	1,004	1,036	1,008
Canada (dollar)	13.48	13.56	11.60	35.06	35.24	30.17
EEC (ecu)	9.11	9.38	8.86	23.68	24.39	23.03
Finland (markka)	44.06	45.58	41.63	114.54	118.49	108.23
France (franc)	62.83	65.14	62.70	163.34	169.35	163.01
Italy (lira)	13,747	14,233	13,322	35,739	37,003	34,635
Japan (yen)	1,732	1,775	1,368	4,502	4,614	3,555
Netherlands (guilder)	21.18	21.83	20.89	55.05	56.76	54.31
So. Africa (comm. rand)	30.41	30.79	26.16	79.07	80.06	68.01
Spain (peseta)	1,154	1,191	1,159	3,001	3,097	3,014
Sweden (krona)	68.50	70.22	63.10	178.09	182.55	164.06
Switzerland (franc)	15.91	16.48	15.93	41.35	42.84	41.43
UK (pound)	6.33	6.67	5.95	16.46	17.35	15.48
US (dollar)	11.70	11.60	9.80	30.425	30.16	25.48
West Germany (mark)	19.46	19.39	18.52	50.59	50.42	48.13

Transaction Value[1]

Country (currency)	per lb equivalent U3O8 as Concentrates			per kg U as Concentrates		
	This Month (July 31, 1990)	Last Month (June 30, 1990)	12 Months Ago (July 31, 1989)	This Month (July 31, 1990)	Last Month (June 30, 1990)	12 Months Ago (July 31, 1989)
Australia (dollar)	12.32	11.18	13.29	32.02	29.07	34.56
Belgium (franc)	321.89	302.41	393.75	836.84	786.19	1,024
Canada (dollar)	11.24	10.28	11.78	29.21	26.74	30.63
EEC (ecu)	7.59	7.12	8.99	19.73	18.51	23.38
Finland (markka)	36.71	34.57	42.27	95.45	89.89	109.89
France (franc)	52.36	49.42	63.66	136.12	128.47	165.50
Italy (lira)	11,456	10,798	13,526	29,782	28,071	35,166
Japan (yen)	1,443	1,346	1,389	3,751	3,500	3,610
Netherlands (guilder)	17.65	16.56	21.21	45.88	43.06	55.14
So. Africa (comm. rand)	25.34	23.36	26.56	65.89	60.73	69.05
Spain (peseta)	961.82	903.77	1,177	2,501	2,350	3,060
Sweden (krona)	57.08	53.27	64.07	148.41	138.49	166.57
Switzerland (franc)	13.25	12.50	16.18	34.46	32.50	42.06
UK (pound)	5.28	5.06	6.04	13.72	13.16	15.72
US (dollar)	9.75	8.80	9.95	25.35	22.88	25.87
West Germany (mark)	16.21	14.71	18.80	42.16	38.25	48.87

[1]Calculated using currency exchange rates published in *The Wall Street Journal* on the last working day of the month.

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MARKET REVIEW

Market Values Expressed In Selected Currencies

Conversion Value[1]

Country (currency)	per lb U as UF_6			per kg U as UF_6		
	This Month (July 31, 1990)	Last Month (June 30, 1990)	12 Months Ago (July 31, 1989)	This Month (July 31, 1990)	Last Month (June 30, 1990)	12 Months Ago (July 31, 1989)
Australia (dollar)	1.83	1.84	2.61	4.04	4.06	5.74
Belgium (franc)	47.87	49.83	77.17	105.54	109.85	170.12
Canada (dollar)	1.67	1.69	2.31	3.68	3.74	5.09
EEC (ecu)	1.13	1.17	1.76	2.49	2.59	3.89
Finland (markka)	5.46	5.70	8.28	12.04	12.56	18.26
France (franc)	7.79	8.14	12.48	17.17	17.95	27.50
Italy (lira)	1,704	1,779	2,651	3,756	3,922	5,844
Japan (yen)	214.59	221.85	272.12	473.09	489.09	599.92
Netherlands (guilder)	2.62	2.73	4.16	5.79	6.02	9.16
So. Africa (comm. rand)	3.77	3.85	5.21	8.31	8.49	11.48
Spain (peseta)	143.04	148.92	230.69	315.35	328.30	508.58
Sweden (krona)	8.49	8.78	12.56	18.72	19.35	27.68
Switzerland (franc)	1.97	2.06	3.17	4.35	4.54	6.99
UK (pound)	0.78	0.83	1.18	1.73	1.84	2.61
US (dollar)	1.45	1.45	1.95	3.20	3.20	4.30
West Germany (mark)	2.41	2.42	3.68	5.32	5.34	8.12

SWU Value and UF_6 Value[1]

Country (currency)	SWU Value at 0.30% Tails Assay			UF_6 Value per kg U as UF_6		
	This Month (July 31, 1990)	Last Month (June 30, 1990)	12 Months Ago (July 31, 1989)	This Month (July 31, 1990)	Last Month (June 30, 1990)	12 Months Ago (July 31, 1989)
Australia (dollar)	63.16	63.54	88.18	41.05	40.67	40.08
Belgium (franc)	1,651	1,718	2,612	1,073	1,100	1,187
Canada (dollar)	57.62	58.43	78.15	37.46	37.40	35.52
EEC (ecu)	38.92	40.44	59.66	25.30	25.88	27.11
Finland (markka)	188.27	196.45	280.37	122.38	125.73	127.44
France (franc)	268.50	280.77	422.26	174.52	179.69	191.93
Italy (lira)	58,748	61,350	89,723	38,186	39,264	40,783
Japan (yen)	7,400	7,650	9,210	4,810	4,896	4,186
Netherlands (guilder)	90.50	94.11	140.69	58.82	60.23	63.95
So. Africa (comm. rand)	129.97	132.73	176.19	84.48	84.95	80.08
Spain (peseta)	4,932	5,135	7,808	3,206	3,286	3,549
Sweden (krona)	292.74	302.66	424.98	190.28	193.70	193.17
Switzerland (franc)	67.97	71.02	107.32	44.18	45.45	48.78
UK (pound)	27.06	28.76	40.10	17.59	18.41	18.22
US (dollar)	50.00	50.00	66.00	32.50	32.00	30.00
West Germany (mark)	83.15	83.60	124.69	54.05	53.50	56.67

[1]Calculated using currency exchange rates published in *The Wall Street Journal* on the last working day of the month.

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RECENT DEVELOPMENTS

USA

National Energy Strategy Update

The development of a National Energy Strategy (NES) has been underway for just over one year. On July 26, 1989, President Bush directed the Secretary of Energy to submit to the President a national energy plan based on the following guidelines.

- Develop an energy strategy through the year 2030 that can be implemented as soon as possible, rather than waiting until the next energy crisis.
- Formulate the program so that it will create public consensus.
- Build upon market reliance, rather than coercion.
- Take a "can do" approach; capitalize on US scientific knowledge and common sense.

Fifteen public hearings were held throughout the country and included testimony of 375 witnesses from 43 states. In addition, over 1,000 written opinions were submitted as input for the composition of the NES. The Department of Energy summarized the public comments and released an interim report in April 1990. Additional comments were due in early July. An inter-agency task force is reviewing the public comment and is beginning to negotiate policies to be included in the NES. The analysis and identification of options is scheduled to be completed by August. Preliminary results are expected following completion of the final review and analysis in September or October. The Energy Department plans to submit the formal proposal to the President by the end of the year for his approval during first quarter 1991.

Four major themes emerged from the public dialogue.

- Increase efficiency of energy use.
- Secure future energy supply sources.
- Respect the environment.
- Fortify the nation's foundations.
  - Increase basic science and research.
  - Improve our educational system.
  - Transfer our research into workable technology.

In the case of nuclear power, opinions varied widely and debate was frequently animated, yet most witnesses agreed that nuclear power could make a significant contribution to the growing national requirements for base-load electricity. However, the solutions to four major obstacles must be effectively communicated to the public.

- **Safety of Nuclear Power**—The industry must demonstrate that it can maintain exacting standards of safety in the design and operation of nuclear power plants and related fuel-cycle facilities.
- **Disposal of Waste Material**—The industry must show it has the technical capability to package, transport, and dispose of spent fuel and high-level radioactive waste in a safe, timely, and environmentally acceptable manner.
- **Licensing and Regulation**—The predictability and efficiency of the licensing and regulatory process must be improved and streamlined, while still assuring compliance with safety requirements.
- **Economics of Nuclear Power**—Industry and government must eliminate barriers to efficient and cost-effective operation of nuclear facilities, and demonstrate to the general public and to investors that nuclear power can be produced economically.

Only when these obstacles are overcome, will nuclear power once again be considered a viable alternative for new electrical capacity in the USA. Nevertheless, nuclear power will remain a key supply source, albeit controversial, in the nation's energy strategy. □

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RECENT DEVELOPMENTS

USA

EdF subsidiary to purchase Malapai

A subsidiary of Electricité de France, in a venture with Total Minerals Corporation (TOMIN—a wholly-owned subsidiary of TOTAL Compagnie Française des Petroles of France), has reached a tentative agreement to purchase Malapai Resources Company from Pinnacle West Capital Corporation. The deal is expected to be completed within 60 days. EdF made the purchase through its wholly-owned subsidiary, Société Auxiliare d'Energie (SAE). SAE established a US-based subsidiary known as FITCO (Fuel International Trading Corporation) to, among other goals, purchase 100 percent of Malapai's stock for a reported price of $38 million.

Although EdF (through FITCO) essentially purchased 100 percent of Malapai, the transaction was structured in a much more complex fashion (**Figure 1**). A joint venture with TOMIN was created to overcome some obstacles and achieve the various goals of all of the parties involved. All of the costs and revenues associated with the TOMIN and Malapai properties will be combined into this new joint venture, which has not yet been named. The new venture will be 29 percent owned by FITCO and 71 percent owned by TOMIN. TOMIN will be the operator of all of the properties (that is, the former individual properties of Malapai and TOMIN), as well as be responsible for the marketing of the venture's production and servicing its contracts. A chief reason for the joint venture structure apparently was to overcome the French government's conviction that it was beyond EdF's mandate as a power producer to own a majority share of a mining company. Another result of the venture is that FITCO will own 29 percent of a much larger uranium-producing enterprise, as opposed to 100 percent of a smaller production entity (Malapai alone).

TOMIN's existing uranium operations and properties include:

- West Cole—an operating in-situ leach (ISL) facility in south Texas;
- Alta Mesa—an in-situ leach project under development in Texas;
- a 45-percent share in Rhode Ranch, the largest conventional uranium strip-mining operation in the USA. Chevron is the operator of this 1.5 million pound per year facility.

TOMIN's participation in the venture will result in increased production capability and an increase in its reserve base to around 45 million pounds. Malapai will continue to exist as a legal entity, using its own inventory to fulfill its long-term contracts. This attractive contract portfolio includes two contracts in Europe, two in the USA, and three in the Far East. Malapai's uranium properties are in-situ leach operations that include Irigaray and Christensen Ranch in Wyoming, and El Mesquite in Texas.

TOMIN was a logical choice as a partner for FITCO because of its ISL experience at West Cole, Texas, and the fact that both companies are French-owned. The establishment of the joint venture will secure TOMIN's position as one of the largest US uranium producers.

Some hurdles must still be overcome to complete the transaction, including normal approval by regulators in Wyoming and Texas. Malapai's headquarters in Phoenix, Arizona is expected to close, and administrative responsibilities consolidated in TOMIN's Houston, Texas headquarters. ■

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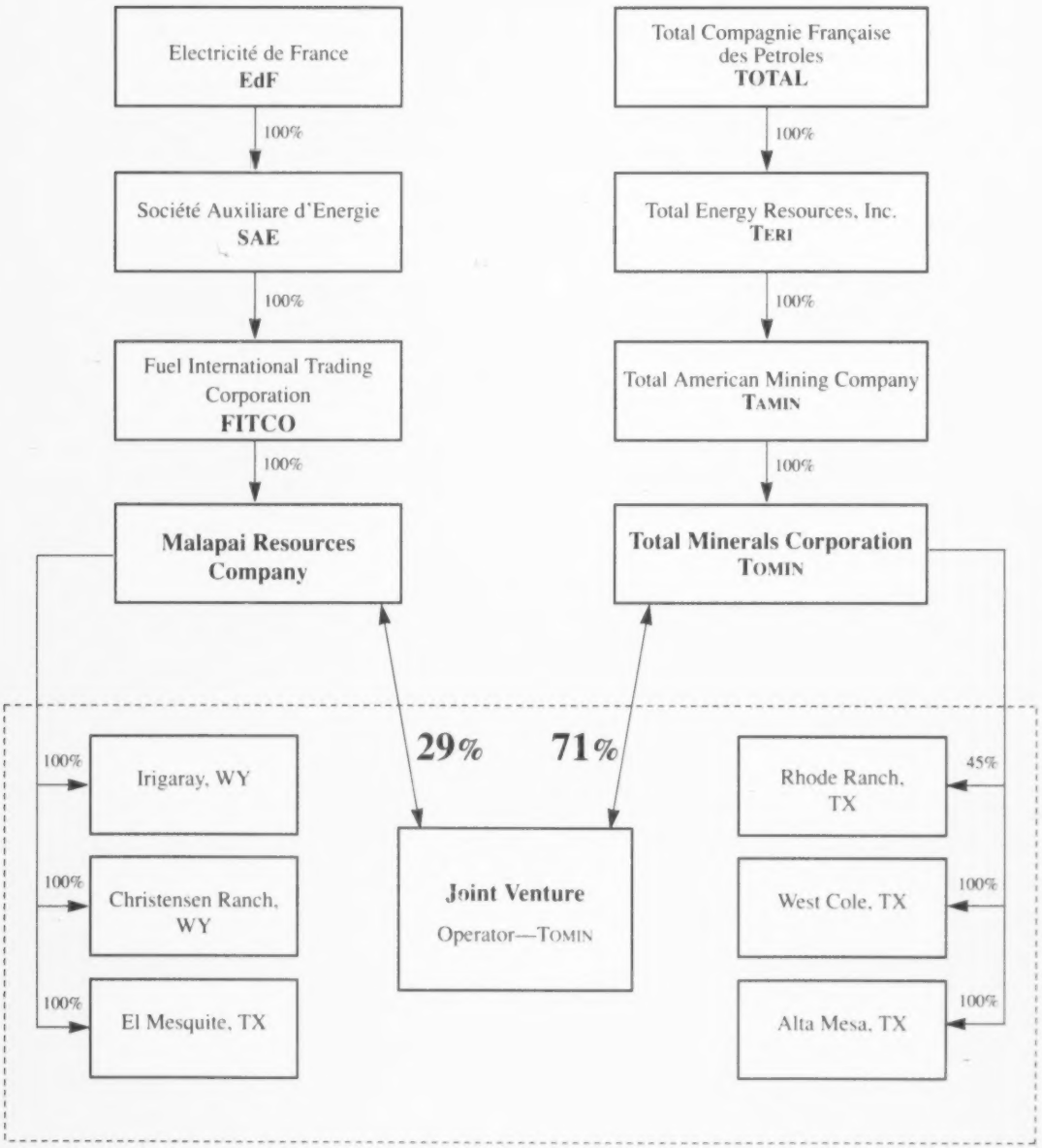
Figure 1
OWNERSHIP AND OPERATING INTERESTS
OF TOTAL AND MALAPAI PROPERTIES



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RECENT DEVELOPMENTS

WASHINGTON FOCUS

Recent weeks have seen considerable Congressional activity on uranium enrichment legislation. On August 2, the Senate passed the Energy & Water Development Appropriations Bill, which funds the DOE and NRC programs. A conference committee must be convened to work out the differences between the House and Senate versions of the Bill. The House Science, Space and Technology subcommittee held one hearing, and also a markup of HR 2480, the House bill to restructure the uranium enrichment program as a government corporation. Also in the House of Representatives, subcommittees of the Energy and Commerce Committee, and the Interior and Insular Affairs Committee held a joint hearing on the Smith Barney report on DOE restructuring. Lastly, the USCEA's Nuclear Fuel Supply Committee met in San Francisco near the end of July.

Senate Energy Appropriations Bill

On August 2, the Senate approved its version of the Energy and Water Development Bill (HR 5019), which funds the DOE and NRC programs. The Senate version would appropriate a total of about $20.7 billion, about $7 million more than the House-version of the Bill. The Senate version allocates $45.5 million more than the House Bill for nuclear energy research and development, but reduces the appropriations for DOE's uranium enrichment program to $1.34 billion (based on lower projected revenues of $1.45 billion). DOE submitted a revised FY91 budget estimate which, if accepted, will result in a $72.4 million net reduction of appropriations from FY90. The reduction is a result of lower projected revenue due to an expected $59 million reduction in defense program sales, and the planned reduction of Gaseous Diffusion Plant (GDP) operating expenses by $135.7 million through the purchase of lower-cost electricity. Some of the savings from the reduced operating expenses will be spent on construction and improvements at the GDP sites, and environmental cleanup.

The Senate Appropriations Committee, when it approved the Bill on July 19, approved full funding for AVLIS ($154.5 million), and gave DOE additional instructions to proceed with AVLIS technology demonstration and deployment as quickly as possible. The committee agreed with the House in refusing to consider DOE's request to establish a decommissioning and decontamination (D&D) fund, or its request to purchase enrichment services. Instead, the Senate and the House indicated they will consider these issues when formulating legislation to restructure the uranium enrichment program. The conference committee will convene after the summer recess.

House Uranium Enrichment Restructuring Bill

The Energy Research & Development (R&D) subcommittee of the House Science, Space and Technology Committee (one of the three committees with jurisdiction over uranium enrichment) has completed action on HR 2480. On July 11th, the subcommittee held a hearing on Smith Barney's recommendations and proceeded to mark up HR 2480 on July 19th. Amendments modified several important areas.

- The bill no longer requires any repayment of "unrecovered costs."
- The corporation will be financially responsible for all three GDPs, including environmental cleanup and the eventual D&D of the plants. The corporation would contribute five percent of gross revenues to a fund specifically created for this purpose.
- The bill does not mandate the licensing of the GDPs, but describes an NRC licensing process that the enrichment corporation must initiate.

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Even though the Smith Barney report makes an excellent argument for assigning no initial debt to the enrichment corporation, the National Taxpayers Union (NTU) is still lobbying the House to require the corporation to assume a debt of $10 billion, which would ultimately be paid by its nuclear utility customers.

Rep. Schiff (R-NM) introduced an amendment which would create a $300 million mill-tailings cleanup fund, which the federal government would manage. Markup by the full committee has been delayed until after the summer recess, due to Rep. Wolpe's (D-MI) request to have a full-committee hearing prior to the markup.

Joint Subcommittee Hearing on Smith Barney Report

◇ On July 31, House subcommittees from the Energy and Commerce Committee, and the Interior and Insular Affairs Committee, held a joint hearing on the Smith Barney report. Rep. Phil Sharp (D-IN) and Rep. George Miller (D-CA) co-chaired the hearing. DOE Under Secretary Henson Moore, Frank Zarb of Smith Barney, Victor Rezendes of GAO, Charles Montange of NTU, and Joseph F. Paquette, Jr., CEO of Philadelphia Electric Company appeared as witnesses.

Most of the questions directed at the witnesses expressed an underlying concern about future liabilities and who is to pay for them. Led by Rep. Miller, critics of DOE and the nuclear industry seemed most concerned with protecting the taxpayer from the financial risks, which are perceived as similar to the bail-out of the savings and loan industry. Many of the questions focused on the unrecovered debt issue. Based on Smith Barney's analysis, it matters not what figure is determined as the debt. Rather, (as even the General Accounting office stated) it is most important that any future entity, either government or private, should not be saddled with a level of debt that would render that entity non-competitive. One persuasive argument for uranium enrichment program privatization, is that private capital markets would make the determination about AVLIS construction, rather than the government, so AVLIS risks would not be borne by the taxpayer. Rep. Sharp and Rep. Dingell appeared willing to consider this issue, particularly because of Mr. Zarb's credibility with the committee deriving from his previous work with Conrail. In addition, if structured correctly, the enrichment corporation could return large sums of money to the Treasury. The fate of the bill this year may be determined by the progress made on the Clean Air bill; if it is passed, Congress may have time to consider enrichment legislation.

DOE Responds to Senate Questions on Uranium Enrichment

◇ DOE released its answers to questions posed by the Senate Energy and Natural Resources committee as a result of a May 1 hearing on uranium enrichment. Among the issues of most concern to the Senators were: DOE's schedule and method for deployment of AVLIS; the impact on DOE of acid rain legislation; decommissioning, decontamination, and environmental cleanup; and the loss of DOE's market share to Techsnabexport (TENEX). Chairman Bennett Johnson asked if additional regulations were needed to use AVLIS for the production of highly-enriched uranium (HEU). DOE maintains that, as currently conceived, AVLIS is designed solely for commercial low-enriched uranium (LEU) production and could be used to enrich HEU only if "significant hardware modifications are made." In a series of questions on D&D and environmental cleanup funds for the enrichment plants, Senator Ford questioned DOE's assessment of the amount necessary, and its ability to collect sufficient funds to pay for these programs. DOE maintains that it has the authority to collect and fund (as currently incurred) the money necessary for environmental cleanup. In FY91, DOE will begin to collect, through its prices, the $3 billion it estimates will be

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necessary to decommission and decontaminate the GDPs. However, for DOE to accomplish the D&D when it is necessary (after 2005), it must retain the money beyond one fiscal year, which is not yet within DOE's authority.

Senator McClure asked what has been done to reduce DOE's power costs. DOE indicated that it anticipates saving more than $100 million per year by purchasing non-firm power (up to 30% of requirements), mainly from Paducah. Rep. Ford asked what quantity of enrichment services DOE anticipates purchasing from TENEX. In response, DOE stated that it is currently contemplating the purchase of just one to two million SWU, and only if the SWU could be purchased below DOE's marginal cost of production. DOE also said that if it does purchase SWU, any resulting savings would be passed along to its customers in the form of lower prices.

USCEA Nuclear Fuel Supply Committee Meeting

AVLIS and CRISLA were the main topics at the USCEA's Nuclear Fuel Supply Committee meeting on July 25th. Dr. Michael J. Stephenson, who is responsible for Martin Marietta's interface with industry on the AVLIS program, described their work on the feed and product programs. He informed the audience that UO_3 had tentatively been selected as the form for both feed and product. Although no final selection has been made, this decision is based on what DOE feels are important health, safety, environmental, and economic considerations. When AVLIS was selected over GCEP, it was based on the assumption that AVLIS would use UF_6. But eliminating the fluorination process improves the economics of AVLIS by about 25 percent. DOE contractors calculated a savings of $6-9 per SWU by eliminating the fluorination step in the feed component, and a $2-4 per SWU reduction in costs if metal is converted back to powder for the product. However, it is unclear if DOE considered the additional costs to convertors and fabricators to build and operate dual lines to handle both UO_3 and UF_6 while AVLIS is being incrementally deployed. Even if the selection of UO_3 proves correct, the lack of dialogue with the industry prior to its selection, especially with the convertors, will cause resistance to its acceptance. If UO_3 is selected, this also could cause utilities and fabricators to maintain additional inventory while the shift from UF_6 to UO_3 takes place. The consideration of these additional costs throughout the fuel cycle may demonstrate that UO_3 is not the best choice.

The selection of the chemical forms for the AVLIS feed and product is a crucial step in the commercialization of AVLIS, as it represents the interface between the US government and private industry. For example, the selection of UO_3 as the AVLIS feed, rather than the uranium metal actually used in the AVLIS process, appears to increase the scope of the AVLIS program beyond the minimum required for enrichment. This appears to conflict with DOE's often-stated intentions not to compete with the private sector. Several private industry sources have the capability of producing uranium metal from UF_4 and UF_6, and DOE admitted that excess capacity exists. Although UO_3 is only a slight refinement from the yellowcake produced at the mill, it is the purity of the UO_3 that is important to AVLIS. Although DOE is considering a specification for UO_3, it would not discuss a uranium metal specification. The UO_3 specification calls for a much higher purity than the uranium oxides typically produced at uranium mills, so AVLIS will still need an additional purification step similar to that used in the current conversion process.

Dr. Stephenson also announced the tentative selection of metallothermic reduction of UCl_4 with magnesium metal, as the DOE process for producing uranium metal from UO_3. The waste stream from the proposed process is magnesium chloride,

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which is recyclable, thus producing fewer environmental concerns than the reduction of UF_4 or UF_6. Since DOE considers it unlikely that private industry will invest in the development of the UCl_4 process prior to the construction of an AVLIS facility, DOE plans to fund development itself.

Dr. Stephenson explained that the enriched uranium metal collected from the AVLIS enrichment process needs to be purified and further processed to adjust enrichment, so it will be dissolved in nitric acid to form ammonium diuranate. After processing, normal industry methods will be used to convert the material to UO_3. DOE explored the alternative of producing UO_2 powder which could be used directly for pellet fabrication, but concluded that there was not a standard UO_2 specification which would be acceptable to all of the fabricators. In this instance, DOE also may have been motivated by the desire to avoid reducing the fabricators' business scope.

DOE announced that contracts have been signed with all five US-based fabricators for initial study of the alterations necessary to the fabrication processes. Although the funding under the contracts is minimal, these contracts begin the process of encouraging the fabricators to accept the AVLIS product. DOE has applied considerable effort to define the AVLIS interface, but most of the effort to date has been internal to DOE, Lawrence Livermore Laboratories, and Martin Marietta. DOE may be concerned that convertors and fabricators will place very conservative cost estimates on the process modifications necessary to utilize AVLIS enrichment unless DOE has successfully demonstrated the modifications. It is unlikely that private industry will make any significant investment to develop the AVLIS infrastructure until the decision is made to build an AVLIS facility. Thus, DOE must make the investment to confirm the costs for the private sector, to prevent utility customers from rejecting the AVLIS process as uneconomic or too risky. DOE may also be looking to take a larger share of the front end of the fuel cycle after privatization of the enrichment enterprise. In either case, it was apparent that the introduction of AVLIS will cause some major changes in the fuel cycle, and the definition of the AVLIS interface will require much more coordination among all of the fuel cycle participants.

Isotope Technologies CRISLA Progress Report

John Hardin of Isotope Technologies (ITI) presented a progress report on CRISLA. He revealed that the testing phase at ITI's Los Angeles laboratory is complete. After testing a range of chemical re-agents, ITI has selected a mixture of silane and hydrogen bromide for the work to follow. ITI believes it can develop a small (200-250 thousand SWU per year) plant that will be competitive in the long-term market. Over the past year, ITI has increased its marketing activities and hopes to have several long-term contracts signed soon. Mr. Hardin announced that a new development site should be identified very soon, and that negotiations with two industrial partners are nearly complete. The two partners are an architectural/engineering firm and a large nuclear fuel cycle company, with "lots of uranium handling experience." One of the partners has a demonstration site which is already licensed and will require only minor modifications. One important advantage of the new partnership will be access to a larger research base. ITI plans to construct a CRISLA unit which is five to ten times larger than their current research equipment, and hopes to operate the demonstration unit by 1992. ■

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INDUSTRY BRIEFS

Japan Completes Test Plant For Laser Enrichment

The Laser Atomic Separation Engineering Research Association, referred to as LASER-J, announced on May 14th the completion of an experimental laser-enrichment plant at the Tokai Research Establishment. The plant is designed to produce 1,000 SWU per year using the AVLIS method. Laser-J initiated plant construction in June 1989. It will perform experiments aimed at confirming the technical feasibility of the process over the next two years. LASER-J, created in April 1987, is a joint investment by nine utilities, the Central Research Institute of Electric Power Industry, Japan Nuclear Fuel Industries and the Japan Atomic Power Company.

♦ ♦ ♦

Saskatchewan Reveals Buyer Percentages

The Ministry of Energy and Mines announced the makeup of the buyers of uranium from Saskatchewan producers in 1989. The US buyers purchased 48% of production; the balance went to Europe (31%), Japan and Korea (12%), and eastern Canada (9%).

West German Utilities To Take Over East German Utilities

East German authorities from the ministry responsible for energy and environmental matters, and from the state trust that holds shares in the country's enterprises, have reached an agreement in which West Germany's three largest utilities, Bayernwerk AG, Preussenelektra AG and RWE AG, will assume control of East Germany's electrical generation industry. East and West German antitrust authorities have yet to comment on whether they will approve the agreement. Only limited details of the plan have been made available.

The plan is separated into two phases. In the first phase, the West German utilities jointly assume a caretaker role, and immediately invest DM2.6 billion to fund the modernization of East Germany's network of utilities. In the second phase, the West German utilities receive an equity interest. The parties to the agreement have not released the timing or the percentage share of these equity acquisitions. It is likely that the three West German utilities then will each control a specific utility region in East Germany.

Mexico Studying Construction Of 20 New Nuclear Plants

As a result of dwindling oil supplies, Mexico is performing technical studies for 20 additional nuclear power plants. Mexico has little coal, gas, thermal, or additional hydro resources to utilize. It also lacks enough foreign exchange to obtain fuels or electricity from other countries. These studies for this ambitious plan are preceding, even though Mexico's yet-to-be licensed Laguna Verde-1 took 15 years and over $3 billion to complete, and despite Laguna Verde-2 being Mexico's only other reactor presently approved or under construction.

♦ ♦ ♦

Cogema Signs Reprocessing Contracts For 15 West German Reactors

At a July 9th press conference, Cogema Chairman Jean Syrota announced the signing of contracts with 11 West German utilities for the reprocessing of nuclear fuel from 2001 through 2015. The quantities reprocessed should approximate one-half of the total West German market. The companies, including Bayernwerk, Preussenelektra, and RWE, already had contracts with Cogema for reprocessing their discharged fuel through 2000.

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DOE's FY91 Incentive Price (IP2) Predicted

NUEXCO estimates an FY91 IP2 cost of $100.60 per SWU. The estimate is based upon the US government's just-released *preliminary* value of 130.9 for the second quarter of 1990 Gross National Product Implicit Price Deflator (GNPIPD) and the most recent second quarter 1985 GNPIPD. To calculate the IP2 value for FY91, multiply the base incentive price of $85 by the ratio of the GNPIPD for the second quarter of 1990 (130.9) to the GNPIPD for the second quarter of 1985 (110.6). [$85 x (130.9/110.6)].

♦ ♦ ♦

West Germany Decommissions Sole Uranium Processing Plant

Gewerkschaft Brunhilde GmbH will be decommissioning its Ellweiler uranium ore processing plant. Alfred Beth, minister of environment and chief nuclear licensing official in the state of Rhineland-Palatinate, suspended the operator's license for the plant on May 31, 1989, because radon gas emanating from mill tailings in the waste dump was found to exceed the 30mrem maximum set by a German radiological protection ordinance. Decommissioning of the plant, near Trier in west-central West Germany, is set to proceed once work on the waste dump is completed in August.

Argentina's Atucha-2 May Be Closed or Sold

Argentine officials stated they may have to quit construction of the country's third nuclear reactor, Atucha-2, due to costs overuns that Argentina can no longer afford. Government officials estimate that the 692-MWe (net) unit will cost US$1.4 billion to complete, a figure nearly 90 percent of the original estimate to construct the entire plant. As an option, Argentina may sell the entire project to a private enterprise, or preferably, seek out private companies to finance the project's completion, while CNEA (Comision Nacional de Energia Atomica) would remain the operator. The plant was most recently estimated to come on line in 1994, already a seven-year delay from the original plans.

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West Germany To Buy Nukem Plant For Plutonium Storage.

The West German Federal Government intends to buy Nukem's fuel fabrication plant. Until it was recently shut down, the plant had been used to provide special fuel elements to the THTR-300 reactor. West Germany plans to store up to 2.5 tons of plutonium in the former fabrication facility.

Saskatchewan Revises Uranium Royalty System

The Ministry of Energy and Mines in Saskatchewan, Canada recently put into effect a new system of royalties for uranium sellers. The new system is retroactive to July 1, 1989, and replaces the previous system which was initiated in 1976 and revised in 1980. Of particular note: a company can now allocate expenditures among joint venture partners based on each partner's invested share of the expenditure, rather than the previous method wherein the determination of the share of the expenditure was based solely on the each partner's percentage share of ownership in the mineral lease; a 15 percent royalty is assessed on gross sales, and is added to a royalty on profits (which are no longer derived from return on capital invested) which ranges from 15 to 50 percent, increasing in cumulative steps as profits increase.

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ANALYSIS AND COMMENTARY

WORLD ENRICHMENT SERVICES MARKET 1990—2005

The following article summarizes the Enrichment Services section of the 1990 NUEXCO Market Analysis and Price Trend Projections for Nuclear Fuel Materials and Services. *That section reviews the forecast of enrichment requirements and projected capacities for 1990–2005, and enrichment technologies and suppliers. The complete report, available from NUEXCO Information Services, contains a detailed forecast of the entire market.*

Overview

Growth in world enrichment capacity, already in oversupply, will lead to a very competitive enrichment services market by the second half of the 1990s. Three of the four primary enrichment suppliers (USDOE, Eurodif, and Urenco) already have the capacity to produce 33 million SWU per year (**Table 1**). Exports from the Soviet Union and the People's Republic of China (PRC) currently make available an additional six million SWU per year, and that figure could rise substantially. With additional supply capability expected from China, the Soviet Union, Louisiana Energy Services (LES) and Isotope Technologies (ITI), and the increased capacity of Urenco, and possibly even AVLIS from DOE, enrichment supply capability could exceed 46 million SWU per year by the year 2000 (**Figure 1**). Yet annual enrichment requirements are only estimated to grow from 23.5 million SWU in 1990, to 28.9 million SWU by 2000. Total unfilled enrichment requirements will rise significantly in the second half of the 1990s, particularly from US utilities, creating sales opportunities for which suppliers will compete aggressively.

These factors foretell a very competitive market in which sellers will offer low prices and flexible contracts. The anticipation of such strong competition also raises the question of which enrichment technology will succeed, and puts tremendous pressure on all suppliers to find cost-effective means of production as quickly as possible.

Table 1
WORLD ENRICHMENT SUPPLIERS—1990

Supplier	Plant	Enrichment Process	Initial Production Date	Nameplate Capacity (Million SWU/year)
DOE	Paducah, KY	Gaseous Diffusion	1954	11.3
	Portsmouth, OH		1956	7.9
				19.2
Eurodif	Georges Besse, France	Gaseous Diffusion	1979	10.8
Urenco	Capenhurst, UK	Centrifuge	1976	1.0
	Almelo, Netherlands		1976	1.5
	Gronau, W. Germany		1985	0.6
				3.1
TENEX	Export from USSR	Centrifuge	1957	3.5
PRC	Export from China	Gas Diffusion		2.5
Japan	Rokkasho	Centrifuge	1988	0.2
TOTAL				**39.3**

Enrichment Requirements

NUEXCO's projection of enrichment requirements is based upon a forecast of electric generating capacity and subsequent forecasts of requirements throughout the fuel cycle. This article uses data from the reference growth case, and assumptions used in these projections are consistent with our other 1990 fuel cycle requirements forecasts. NUEXCO's July 1990 Monthly

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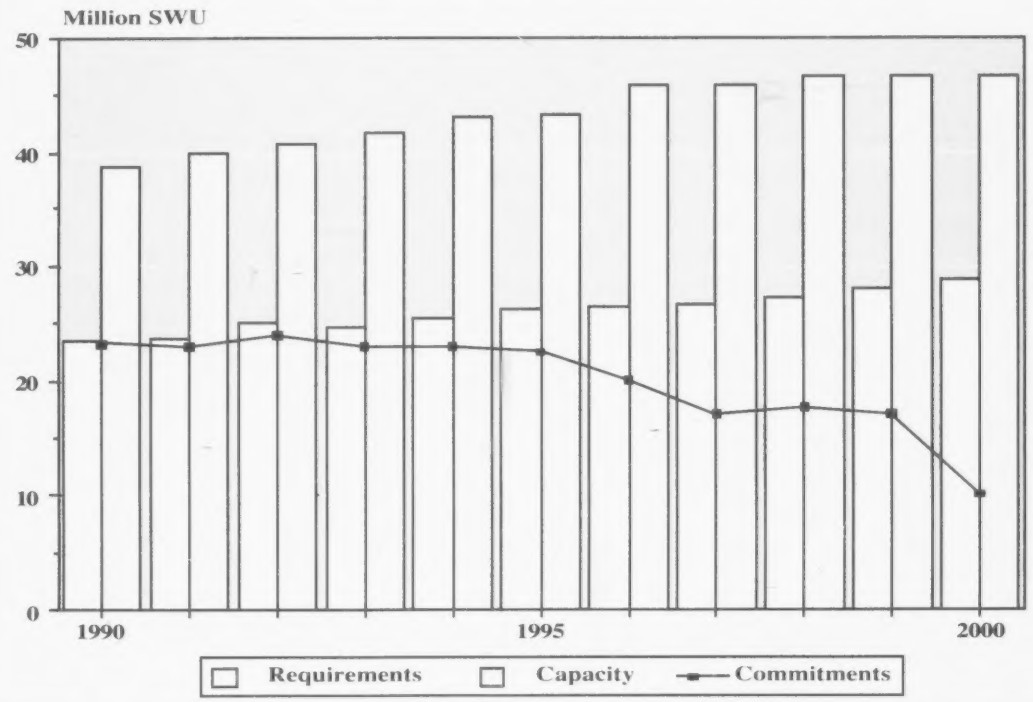
Figure 1
WORLD ENRICHMENT SUPPLY, REQUIREMENTS, AND COMMITMENTS



Report (No. 263, p. 22) contains an overview of our projection of generating capacity and uranium requirements.

NUEXCO projects enrichment requirements at 23.5 million SWU in 1990, increasing to 28.9 million SWU in 2000 and 30.7 million SWU in 2005. This is an average annual growth rate of 2.1 percent per year from 1990 to 2000 (**Table 2**). Regionally, Europe has the largest absolute requirements with 10.1 million SWU needed in 1990, followed by the USA with 9.2 million SWU. The Far East and other countries have the lowest total requirements, but have the highest growth rates through the year 2000. In the category "Other Countries", the preponderance of heavy-water-moderated reactors that use natural uranium fuel causes that category to consume relatively small amounts of enrichment services per unit of installed capacity.

Table 2
PROJECTED ENRICHMENT REQUIREMENTS BY REGION

Region	Requirements (Million SWU) 1990	2000	2005	Annual Growth 1990–2000 (Percent per Year)
Europe	10.1	12.1	13.2	1.8
Far East	4.1	6.2	7.1	4.3
Other Countries[1]	0.2	0.8	0.7	16.2
United States	9.2	9.8	9.8	0.7
Total	**23.5**	**28.9**	**30.7**	**2.1**

[1] Brazil, India, Mexico, Pakistan, and South Africa

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This projection uses an enrichment tails assay of 0.30 percent U^{235}. **Table 3** shows the cumulative enrichment requirements through 2000 and displays the result of lower tails assays on enrichment requirements. Enrichment requirements would increase by about 25 percent if the tails assay were reduced from 0.3 to 0.2 percent.

Table 3
CUMULATIVE ENRICHMENT REQUIREMENTS 1990–2000 BY TAILS ASSAY

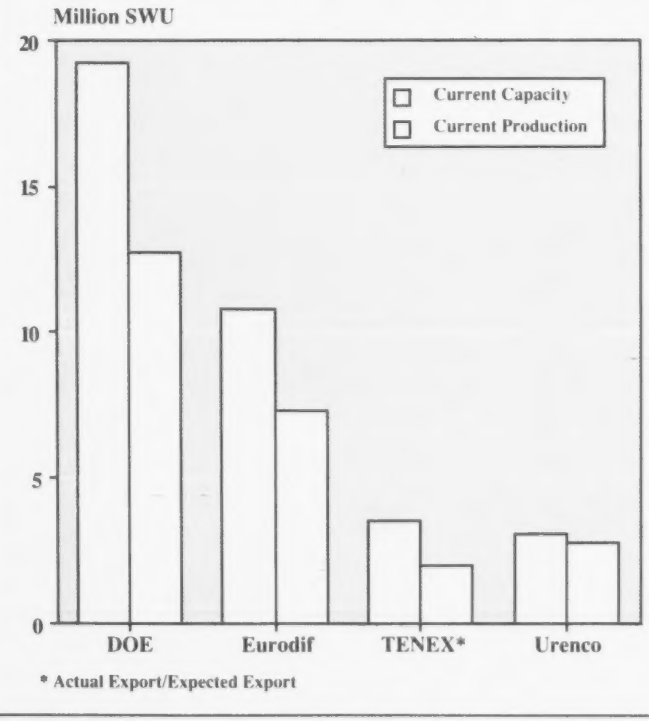
Enrichment Tails Assay (percent U^{235})	Million SWU	Relative to Reference Case
0.30	285.7	0.0 %
0.25	316.6	+10.8 %
0.20	356.2	+24.7 %

Enrichment Capacity

The projected supply of enrichment capacity almost doubles utility requirements through the year 2000. DOE and Eurodif, the two largest western primary enrichment services suppliers, are operating below their nameplate capacity and Techsnabexport (TENEX) of the Soviet Union is exporting only a portion of its capability.

Figure 2 shows the current capacity and production levels of the four major suppliers of enrichment services. In 1989, DOE produced 12.7 million SWU, which represents only 68 percent of its nameplate capacity. Its capacity of 19.2 million SWU per year accounts for 50 percent of market capacity. Eurodif produced 8.5 million SWU in 1989, and expects to produce 7.3 million SWU per year during the mid-1990s. This also is only a portion of its 10.8 million SWU capacity, which can be readily expanded to 12.8 million SWU per year by increasing its pumping power.

Figure 2
WORLD ENRICHMENT CAPACITY AND PRODUCTION



Urenco produces near its current capacity of 3.1 million SWU per year to meet its long-term commitments. Although its capacity may appear to be largely committed at any particular time, additional centrifuge production capability can be installed in significant increments on relatively short notice. Urenco's strategy permits the installation of additional capacity only at the rate needed to service its contracts.

TENEX's export capability, currently estimated at 3.5 million SWU per year, is expected to rise to five million SWU per year by the mid-1990s, which would represent about 15 percent of the market (**Figure 3**). Additional uncommitted supply totalling nearly two million SWU per year could be available from LES (1.5 million SWU), and Isotope Technologies (250 thousand SWU) by

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the middle of the decade. Exports from China could increase SWU supply by another two million SWU per year. Furthermore, substantial inventories of enriched uranium product (EUP) are currently available through loans or sales. A number of governments and utilities are making this material, estimated at over three million SWU, available to the spot market.

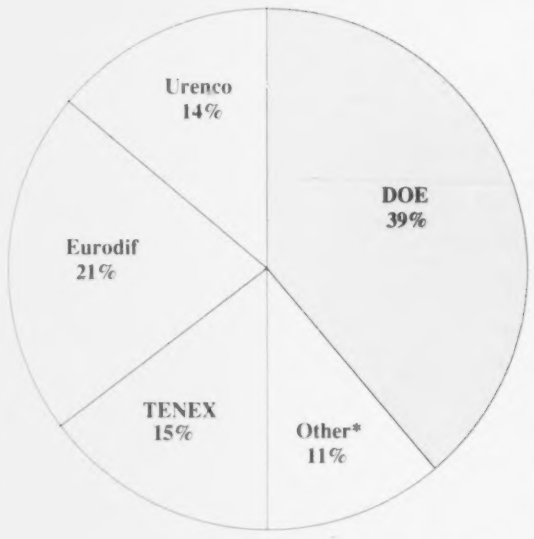
Enrichment Technologies and Suppliers

The large oversupply of enrichment capacity leads to aggressive marketing efforts by suppliers to get contracts, puts pressure on suppliers to have efficient, cost-effective production, and raises a number of questions. Which technology will survive this intense competition? Will centrifuge enrichment from established suppliers such as Urenco and the Soviet Union,or new production from LES take over as the primary technology? Or will the timely demonstration and deployment of laser technology, such as AVLIS and SILVA, save DOE's market share, help Eurodif expand its share, and also offer opportunities to newcomers like Isotope Technologies?

Of all the suppliers, DOE has the most to lose. Major uncertainties facing DOE include the successful deployment of AVLIS technology, acid rain legislation, decommissioning costs for its aging gaseous diffusion plants, environmental compliance, and restructuring legislation. DOE is depending on AVLIS technology to maintain its market leadership. While laser technology does have a significant cost advantage over other technologies (**Figure 4**), it is as yet unproven on a commercial scale.

Centrifuge processes continue to evolve, becoming more efficient and cost-effective with each new generation of designs. Urenco has lowered its operating and maintenance costs significantly, and reduced its electricity requirements per SWU to only two percent of the electricity requirements of a comparable gaseous diffusion plant. (Specific cost figure estimates for suppliers are provided in the complete report.) The Louisiana Enrichment Services plant (47 percent owned by Urenco) is planned for commercial operation by 1996 with a production capacity of 1.5 million SWU per year, using this new generation of centrifuge cascades.

Figure 3
PROJECTED MID-1990S MARKET SHARE



SWU Spot Market

The SWU spot market is characterized by demand from a limited number of utilities who purchase some portion of their requirements outside of their primary enrichment contracts, and from intermediaries. Historically, supply in the spot market comes from excess utility inventories and from national stockpiles when the government agency has come under political or financial pressure to sell the material. Primary enrichment suppliers participation in the spot market is infrequent.

NUEXCO projects that the SWU spot price will escalate gradually during the 1990s. This assumes that the introduction of national stockpiles into the spot market may cause prices to drop, but as inventories are exhausted, prices will gradually rise to a level determined by the lowest cost primary enrichment producer. However, other events could affect the market. For instance, if economic events force TENEX to alter its marketing strategy and sell SWU at levels closer to their marginal cost in order to generate more hard currency, this could slow any general price rise. On the other hand, political events could make

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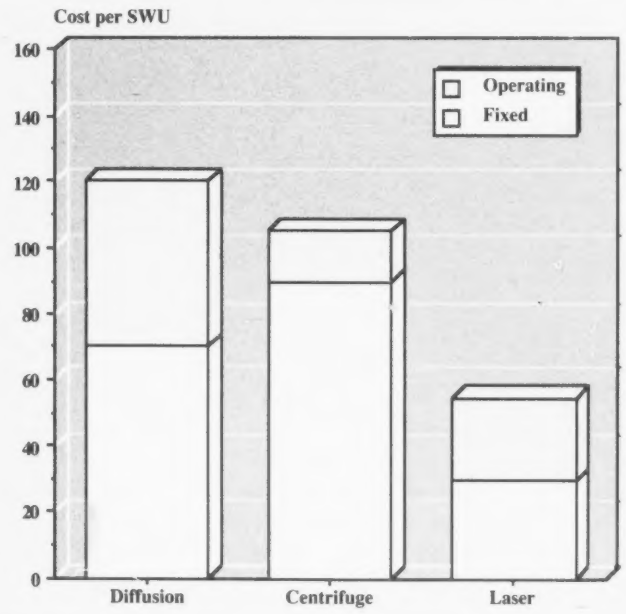
Soviet material unavailable to western utilities, and thus could cause prices to rise to the level of the next lowest cost producer.

Overall, strong competition for limited demand will preclude any major SWU spot price increase before 1993. As inventories are drawn down and more capacity comes on line, competition is expected to be fierce for the large unfilled requirements, particularly from US utilities after 1996. The SWU spot market may evolve in a manner similar to the evolution of the conversion market; that is, primary suppliers may sell some SWU into the secondary market at a discount off the long-term price. ■

Figure 4
ENRICHMENT PRODUCTION COSTS
(in constant 1990 US Dollars)



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SOUTH AFRICA UPDATE

This article updates some of the key developments in South Africa in the first half of 1990, including uranium production figures, progress on a mining privatization bill, and the status of sanctions levied upon South Africa by the rest of the world.

First Half 1990 Production

Uranium production levels continued to fall in South Africa during the first half of 1990 (**Figure 1**). Second quarter concentrates output dropped to 1.6 million pounds equivalent U_3O_8, down 9.7 percent compared to the first quarter figure (**Table 1**). First quarter production volume had fallen 7.5 percent from fourth quarter 1989 levels, and second quarter output represents a 16.5 percent decline from the end of 1989. This decrease is largely the result of the March 1990 shutdown of uranium production at Freegold's Joint Metallurgical Scheme operation, South Africa's second largest uranium producer. As of the end of 1989, South Africa's uranium recovery operations were producing at an annual rate of about 7.5 million pounds. As of mid-1990, that rate has fallen almost 20 percent, to approximately six million pounds per year.

If no further cutbacks occur, and if existing facilities produce at the same level they did during the first half of the year, second-half results would bring South Africa's 1990 output to 6.5 million pounds equivalent U_3O_8, about 88 percent of 1989's total. But, cutbacks in uranium production are possible for at least three mining facilities: Ergo, Western Areas, and Hartebeestfontein. Those three contributed 24 percent of second quarter 1990 production. If they ceased uranium recovery, Buffelsfontein and Vaal Reefs would be the only remaining South African producers, and annual output would be about five million pounds U_3O_8, which is about two-thirds of the rate as of the end of the of 1989, and less than one-third of South Africa's peak output.

The uranium section of the Ergo plant could be closed in the mid-1990s because the declining sulfide content of the tailings could render the current system of gold and uranium recovery uneconomic. Closing the uranium plant and its associated facilities would reduce gold production, but this reduction would be more than balanced by a substantial decrease in working requirements. If Ergo closes, South Africa's annual output, will be cut by approximately 5 percent (382,000 pounds U_3O_8), based on 1989 production levels.

At Western Areas, operating costs currently exceed operating revenues and the company has applied for government assistance in order to continue operations. Such assistance has been granted to other gold mines in the past, but qualifications for assistance are becoming increasingly restrictive. If the government does not grant any

Table 1
SOUTH AFRICA URANIUM PRODUCTION[1] FIRST HALF 1990
(Thousands Pounds U_3O_8)

Operation	Fourth Quarter 1989	First Quarter 1990	Second Quarter 1990	Percent Change[2]
Buffelsfontein	187	190	174	-8.1
ERGO[3]	87	57	57	-1.2
Freegold[4]	236	213	85	-60.0
Hartebeestfontein	195	194	179	-7.7
Vaal Reefs	1,021	948	925	-2.4
Western Areas	136	120	135	+11.9
TOTAL[5]	**1,863**	**1,723**	**1,555**	**-9.7**

[1] Excludes Palabora Mining Company, which is not a member of the Chamber of Mines.
[2] Change in percent from the first quarter of 1990 using exact production figures.
[3] ERGO = East Rand Gold and Uranium Company Ltd.
[4] Formerly Free State Joint Metallurgical Scheme.
[5] Addition of columns may not equal *TOTAL* due to independent rounding.

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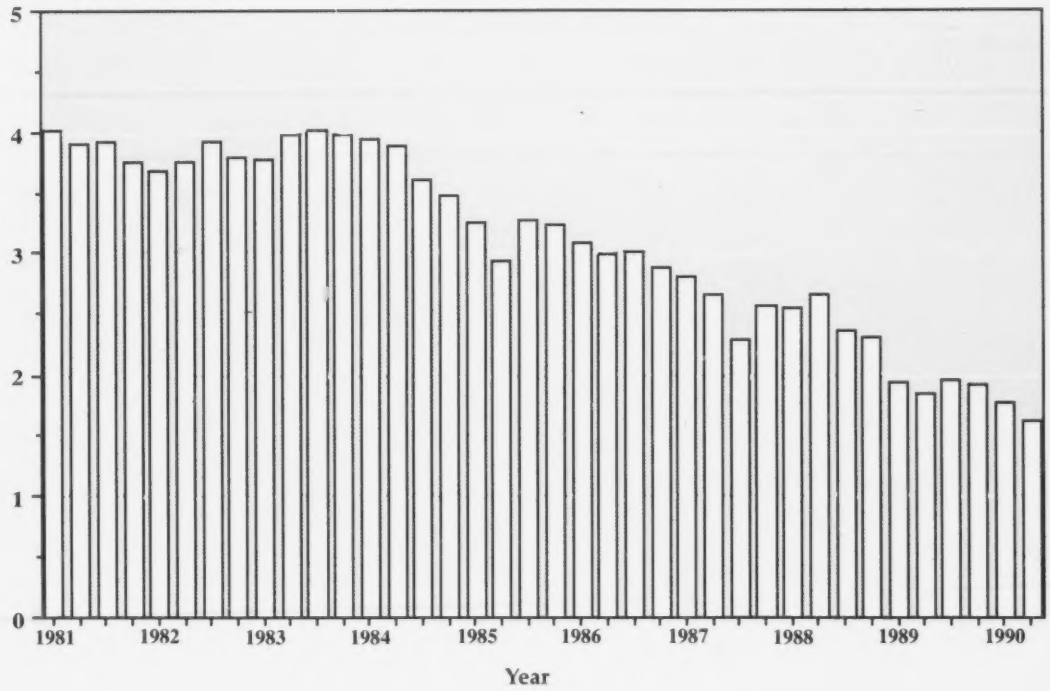
ANALYSIS AND COMMENTARY

Figure 1
SOUTH AFRICA
QUARTERLY URANIUM OUTPUT



assistance, the operators could be forced to shut down the facility. That would eliminate nearly seven percent of the nation's uranium production.

Hartebeestfontein is currently reporting major financial losses in the production and sale of uranium. However, the financial loss attributed to uranium is more than offset by increased gold recovery because of its use of the reverse leaching system which recovers uranium prior to gold. But that effect is not apparent on the company's income statement, so the perceived loss on uranium has become a cause for concern. To the extent that investors fail to appreciate uranium's contribution to the company's overall profitability, Hartebeestfontein management could come under pressure to terminate or suspend uranium recovery operations.

The shutdown of Freegold's Joint Metallurgical Scheme operation was attributed to decreasing uranium grades and increasing operating costs. Freegold has indicated however, that tests are underway to determine the feasibility of lower levels of production using selected higher grade feedstock.

Mining Privatization

The South African government, through its Department of Mineral and Energy Affairs, has been considering the reduction its role in the awarding of prospecting and mining rights. The Minerals Bill, the vehicle for this restructuring of the mining industry, was published in preliminary form in 1988 for comment and was discussed with interested parties during 1989. In early 1990, the bill was introduced in Parliment with the expectation that it would be passed during the first half of the year. The fate of the bill, once thought virtually certain to be enacted, is now quite uncertain.

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The objects of the Bill are consolidation, rationalization, privatization, deregulation, and implementation of principles relating to mining practices and surface rehabilitation. Under present law, the right to mine for certain minerals is vested in the State, which controls such activities by means of a system of mining leases and other forms of mining title. Under the Minerals Bill, the current system would be replaced by one that gives full recognition to the rights of the mineral right holder to prospect, mine, and dispose of minerals, subject to authorization from the State. Such an authorization would be intended as a control mechanism embodying the principles of optimal and safe mining, and surface rehabilitation.

The bill has stimulated much discussion. Although this bill, if enacted, would abolish the current forms of mining lease and other mining title, it also would aim to preserve existing rights. The issues of preservation of existing rights and the desirability of privatization have been some of the most contentious issues in discussions on the bill. Some of its critics object to provisions that would increase the difficulty and expense of controlling mineral properties for long periods of time. Others object to various procedural matters, such as the length of the phase-in period and other implementation provisions. But others make far more fundamental objections to privatization itself. For example, some critics argue that privatization, whether in the mining industry or any other, is designed to transfer the most valuable State-owned assets beyond the reach of the country's black majority. Proponents argue that privatization would enhance competition, thereby fostering growth in the mining industry and contributing to a healthier South African economy from which all citizens would benefit. The Parliamentary Joint Committee appointed to consider the bill and evaluate comments by interested parties is now reassessing the privatization philosophy underlying the bill, so it will not be passed before next year.

This step toward deregulation of the industry, if implemented, would constitute one of the most substantial changes yet undertaken in a series of South African government moves towards privatization of the nation's economy. Its near-term impact would depend primarily on the specific procedures established for its implementation. Its ultimate impact would depend on the outcome of the socio-political struggle in which the country is engaged.

Sanctions Update

South African President F.W. de Klerk has managed to maintain control in his strife-torn country and make some progress toward ending apartheid—enough progress that some individuals and nations are calling for an easing, or even lifting, of sanctions against South Africa. For example, Portugal and Italy have called for a worldwide lifting of sanctions. Britain has lifted its ban on new investment in South Africa, and at a June 26th meeting, the European Community issued a statement promising to relax sanctions if De Klerk's reforms continue.

At the same time, Nelson Mandela is urging the USA—the only nation to impose legislative sanctions—and other nations to continue sanctions in order to extract further concessions from Pretoria. Although studies have shown that sanctions have failed to deny South Africa access to markets and vital commodities such as oil, economic sanctions, as a whole, have imposed tremendous economic penalties on South Africa. For example, a study by the US-based Investor Responsibility Research Center found that sanctions have cost South Africa's economy $15 billion to $27 billion.

Although George Bush as Vice President opposed sanctions in 1986 when the US Congress overrode President Reagan's veto of the Comprehensive Anti-Apartheid Act of 1986 (CAAA), Bush administration officials have pledged not to lift sanctions against South Africa until all conditions of CAAA have been met, and only after consulting with Congress. However, not all the requirements of the CAAA have been met. For example, only a handful of the more than 1,000 political prisoners presently held have been released, and De Klerk has not lifted the government's State of Emergency order in the Natal province. Furthermore, no lifting of US sanctions against South Africa is feasible until after the November Congressional elections, for even if all conditions were met beforehand, the Bush administration would be unwilling to face the inevitable political backlash until after the elections. Nevertheless, the South African government is making progress toward a democratic, non-racial society. The time line shown in the accompanying box lists noteworthy events in recent South African history. The lifting of US sanctions, once almost unthinkable, is now only a matter of time. ■

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ANALYSIS AND COMMENTARY

SOUTH AFRICAN TIME LINE

August 15, 1989 — F.W. De Klerk becomes acting president, following the resignation of P.W. Botha.

September 6 — National Party retains power by slender margin in parliamentary elections. De Klerk asserts that results give him a "clear and resounding mandate" to push ahead with plans for evolutionary change.

October 15 — Walter Sisulu and five other African National Congress (ANC) activists released from prison.

February 3, 1990 — De Klerk announces legalization of the ANC, the South African Communist Party, and the Pan-Africanist Congress, and lifts restrictions on 33 other opposition groups.

February 11 — Nelson Mandela released after more than 27 years in prison.

May 2-4 — "Talks about Talks." De Klerk and Mandela lead government/ANC talks on obstacles to negotiations.

June 7— De Klerk lifts state of emergency, renewed annually by the government since 1986, in all areas except Natal province, still plagued by politico-tribal violence between supporters of Mandela's ANC (primarily Xhosa tribe) and Chief Buthelezi's Inkatha movement (primarily Zulu).

June 19 — Parliament repeals Separate Amenities Act, paving way for integration of all public facilities

June 20 — Mandela begins 12-day, eight city US visit, including address to UN General Assembly.

June 25 — Mandela meets with President Bush, calls on USA to maintain sanctions against the Pretoria government.

August 6 — Mandela and De Klerk make breakthrough agreement clearing the way for full-scale negotiations on a new power-sharing constitution. The ANC announced that it will immediately suspend its 29-year armed struggle against white-minority rule. Beginning September 1, the Pretoria government will allow the phased release of the remaining political prisoners—estimates range from 1,300 to several thousand—and will grant amnesty to about 22,000 anti-government exiles. Crucial to that process are the definition of political offenses and the repeal of internal security laws that have been used to impose criminal penalties for political acts.

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US URANIUM EXPLORATION AND DEVELOPMENT UPDATE

The US uranium industry can be compared to someone who has been through a serious accident or trauma; the patient is in a coma, but the vital signs are still there. Though the industry is weak, some exploration and development drilling is still underway, and the industry can return to health if no further complications occur.

Current Activity

In the western United States during early 1990, three to four drill rigs have been engaged in uranium exploration, and about twice that number in development. In the fair weather of summer and fall, traditionally the prime drilling season, the rig count will likely peak between 25 and 30. Thus, at least a portion of the industry seems to be surviving, in spite of the events of the last decade.

In 1990, US uranium exploration activity will be only slightly less than that of the last few years. The two main concentrations of current drilling activity—high-grade breccia pipes of the Arizona Strip mining district, and in-situ leaching (ISL) projects in several western states—had only very minor roles ten years ago. Exploration drilling in the Arizona Strip is a conventional effort focused on the discovery and definition of small cross-section, vertical, breccia pipes that contain high-grade mineralization with average grades approaching 1.0 percent equivalent U_3O_8. The bulk of the ISL activity is development drilling at projects in Nebraska, Texas, and Wyoming. In addition to those developments, some drilling is taking place in the Uravan district of western Colorado in order to maintain reserves at active mining operations.

Highly speculative exploration is an ongoing process in the Arizona Strip. (For district description see NUEXCO Monthly Reports No. 163, p. 14, and No. 176, p. 19.) Three companies, Energy Fuels, Pathfinder Mines, and Union Pacific Resources, control most of the land in the district and have been active in their exploration efforts for a number of years. Only Energy Fuels has produced any uranium so far, but the other two companies have identified potentially commercial deposits. The exploration efforts of all three companies are supported primarily by foreign interests: Energy Fuels—by a consortium of Swiss utilities and German interests; Pathfinder Mines—by Cogema of France; and UP Resources—by Taiwan Power Corporation.

During early 1990, UP Resources was the most active explorer, with two rigs in the field for most of the period. While UP Resources has holdings both north and south of the Grand Canyon, the bulk of the drilling took place on the south side, just east of the Hualapai Indian Reservation. The recently published US Geological Survey (USGS) Bulletin 1683-B, *The Potential of Breccia Pipes in the National Tank Area, Hualapai Indian Reservation, Arizona* discusses the district geology in detail. In 1988, the US Geological Survey's Uranium Resource Assessment Group, using the deposit-size-frequency method, suggested that the uranium endowment in the breccia pipe deposits of the Arizona Strip could be as much as eight times that reported in 1980. Therefore, this district has the potential to become the second biggest uranium district in the USA, following the San Juan Basin of New Mexico. USGS Circular 1051 summarizes the 1988 resource evaluation of the Arizona Strip district.

ISL projects, because of their generally low capital and operating costs, plus smaller-scale permitting requirements, have survived somewhat better than most conventional mining projects. A cadre of experienced production and exploration staff have built up the ISL industry, which is actively looking at known sandstone deposits as potential candidates for this new mining method. Two operators, Malapai Resources Company and Total Minerals Corporation, a wholly-owned subsidiary of Total Compagnie Française des Pétroles of France, have conducted most of the ISL drilling in the USA so far in 1990. Recently, Total performed due diligence work at the Malapai properties for Electricité de France who, together with Total, announced plans in late July to purchase Malapai's properties.

Ferret Exploration, with the support of German and Korean interests, did some development drilling on its Crow Butte project early in the year. This future production center has now acquired all necessary permits, and construction began earlier this year. No official announcement has been made about the actual date of production, but the project is expected to be able to start up early in 1991.

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Possible Future Exploration

While little other ISL evaluation activity occurred in early 1990, the pace could increase later in the year. Uranerz Exploration and Mining (West Germany), after making a major investment in the Rabbit Lake uranium project in western Canada, has let it be known that all of its ISL properties in the USA are available for sale at the right price. Uranerz is closing its Casper, Wyoming office, and will in the future have only the Saskatoon, Saskatchewan and Denver, Colorado exploration offices in North America. However, the Denver office will focus on gold exploration.

Many uranium deposits that had been planned for conventional mining are now being reviewed for possible ISL exploitation. This process of resurrection and transformation is likely to generate additional drilling in the near term in New Mexico and Wyoming.

On June 1, 1990, Kennecott Corporation, a wholly-owned subsidiary of RTZ Corporation (UK), formed a 50/50 joint venture with US Energy Corporation of Riverton, Wyoming. Kennecott, of Salt Lake City, Utah, paid a total of $15 million to US Energy, and will fund the first $50 million of development work on the Green Mountain project in central Wyoming. Some drilling will probably be carried out on this site before the end of 1990.

Recent Closures and Shutdowns

Activity in most other areas involves retrenchment, reduction of land holdings, project closings, reclamation, and abandonment. The largest example of this type of activity in 1990 occurred in the San Juan Basin of New Mexico, which had been the site of the largest uranium mines and mills in the USA. All production in the district has now ceased and the two major production centers are on standby awaiting better market conditions. The former Kerr-McGee complex, now owned by Rio Algom Mining Corporation (also ultimately controlled by RTZ Corporation) has been shut down since 1985, and Homestake Mining just recently ceased milling ores from Chevron's Mt. Taylor mine and from Homestake's Section 23 mine.

Both the Mt. Taylor and Section 23 mines are being allowed to flood, effectively removing those deposits from the marketplace for many years. Tennessee Valley Authority (TVA) has offered its properties for sale, plans to sell excess equipment, and has reduced the staff at its Casper, Wyoming field office. Pathfinder Mines is closing its St. George, Utah exploration office and moving part of the staff to Reno, Nevada, where the emphasis will be on gold. Cotter Corporation, wholly-owned by Commonwealth Edison, has put its Schwartzwalter underground mine on standby, but maintains a small office in Naturita, Colorado which will continue evaluation work in that district.

Conclusion

With these changes as a backdrop, US uranium exploration and development has deteriorated to its lowest level, and the degree of any recovery may depend almost wholly upon foreign interests. Nevertheless, a heartbeat is still detectable, and in general, the mining industry has a history of surprising resilience.

Tom Pool
Bob Steele

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NUCLEAR INDUSTRY CALENDAR

1990

Sept. 4-7 ***International Seminar on the Costs and Financing of Nuclear Power in Developing Countries*** (Jakarta, Indonesia). Contact Conference Service Section, IAEA, P.O. Box 100, A-1400 Vienna, Austria.

Sept. 5-7 ***Uranium Institute 15th Annual Symposium*** (London, England). Contact the UI by facsimile at 071-225-0308.

Sept. 13 ***The New Currency: How to Capitalize on Air Emissions Credits*** (Watergate Hotel, Washington, DC), sponsored by The Energy Daily. Contact Lissa Wilson at 1-202-662-9728.

Sept. 13-14 ***The Ninth Annual Nuclear Conference: "STANDARDIZATION: Can it Save the Nuclear Industry?"*** (Stouffer Concourse Hotel, Washington, DC). Sponsored by McGraw-Hill Nuclear Publications. Contact McGraw-Hill at 1-800-223-6180 (in NY state: 212-512-6410)

Sept. 16-19 ***Uranium Seminar '90*** (Hyatt Regency, San Antonio, Texas). Sponsored by the USCEA. Contact the USCEA Conference Office at 1-202-293-0770.

Sept. 23-26 ***AMC Mining Convention*** (New Orleans, Louisiana). Contact American Mining Congress, Suite 300, 1920 N Street N.W., Washington, D.C. 20036, or facsimile 1-202-861-7535.

Sept. 23-28 ***ENC '90 Congress & Exhibition*** (Lyon, France). Organized by the European Nuclear Society in collaboration with the ANS and Foratom. Contact Dr. P. Feuz, European Nuclear Society at 31-21 61 11.

Oct. 14-16 ***World Nuclear Fuel Market Annual Meeting*** (Toulouse, France). Contact Donna Cason at 1-404-447-1144.

Nov. 11-14 ***Nuclear Energy Forum*** (Washington Hilton, Washington, D.C.). Sponsored by the USCEA and ANS. Contact the USCEA Conference Office at 1-202-293-0770, or the ANS Meetings Department at 1-312-352-6611.

Nov. 12-16 ***First Regional Seminar for Europe and the Middle East on Quality Management for Nuclear Power Projects*** (Prague, Czechoslovakia). Sponsored by the International Atomic Energy Agency. Contact Conference Service Section, IAEA, P.O. Box 100, A-1400 Vienna, Austria.

1991

April 14-18 ***Third International Conference on Nuclear Fuel Reprocessing & Waste Management*** (Sendai, Japan). Sponsored by the Atomic Energy Society of Japan and the Japan Atomic Industrial Forum, co-sponsored by the American Nuclear Society and the European Nuclear Society. Contact the Japan Atomic Industrial Forum at telephone 3-508-2411, or facsimile 3-508-2094.

May 13-15 ***Second International Conference on Transportation for the Nuclear Industry*** (Bournemouth, England). Contact the Conference Secretary, The Institution of Nuclear Engineers, at 081-698 1500.

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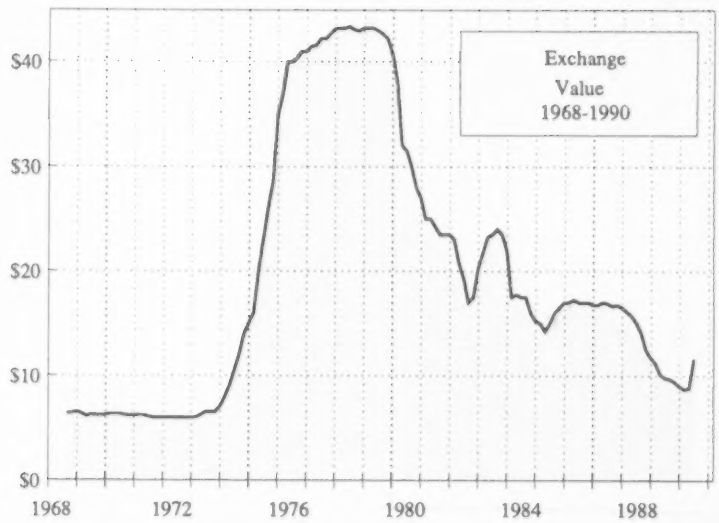
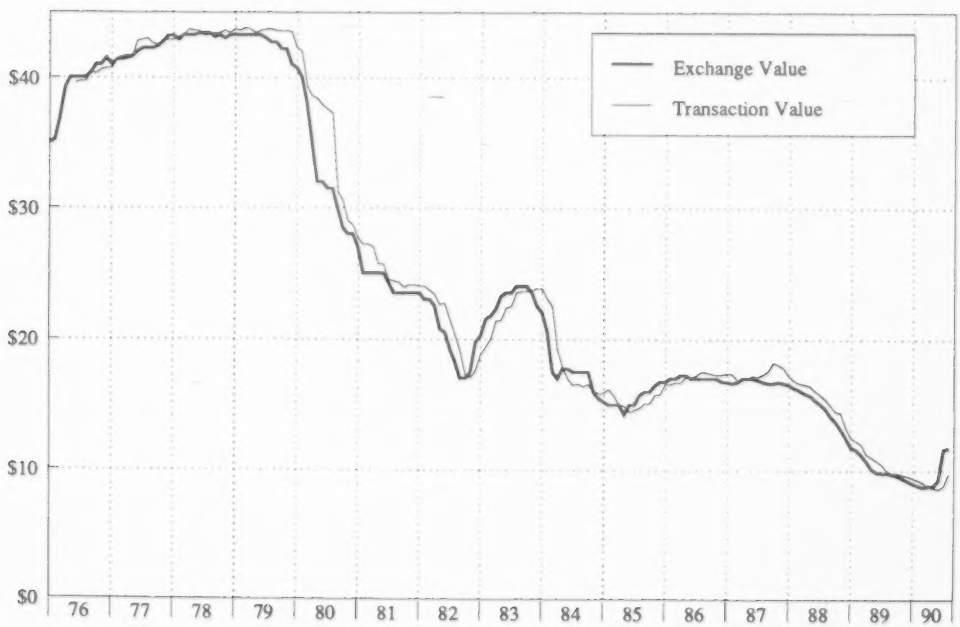
HISTORICAL MARKET DATA

NUEXCO Historical Exchange Value and Transaction Value
(In US Dollars per Pound Equivalent U3O8)





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HISTORICAL MARKET VALUES

EXCHANGE VALUES

Determined as of the last day of the month indicated ($US/lb U_3O_8)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1968	—	—	—	—	—	—	—	6.35	6.35	6.40	6.45	6.50
1969	—	6.35	6.10	6.10	6.25	6.25	6.20	6.20	6.15	6.15	6.15	6.20
1970	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.20	6.15	6.15	6.15	6.15
1971	6.20	6.20	6.20	6.20	6.15	6.05	6.00	5.95	5.95	5.95	5.95	5.95
1972	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95
1973	5.95	6.00	6.10	6.20	6.45	6.50	6.50	6.50	6.50	6.50	6.75	7.00
1974	7.70	7.90	8.00	9.00	9.50	10.50	11.50	12.00	12.50	14.00	14.75	15.00
1975	16.00	16.00	18.00	20.00	21.00	23.00	24.70	26.00	26.00	28.50	30.00	35.00
1976	35.20	37.00	39.25	40.00	40.00	40.00	40.00	40.40	41.00	41.00	41.50	41.00
1977	41.35	41.50	41.60	41.60	42.00	42.25	42.25	42.25	42.40	42.75	43.20	43.20
1978	42.90	43.25	43.25	43.25	43.40	43.40	43.40	43.10	43.25	43.00	43.25	43.25
1979	43.25	43.25	43.25	43.25	43.25	43.00	42.70	42.70	42.20	42.20	41.00	40.75
1980	40.00	38.00	35.00	32.00	32.00	31.50	31.50	30.00	28.50	28.00	28.00	27.00
1981	25.00	25.00	25.00	25.00	25.00	24.25	23.50	23.50	23.50	23.50	23.50	23.50
1982	23.00	23.00	22.50	20.75	20.50	19.25	18.25	17.00	17.00	17.50	19.75	20.25
1983	21.50	21.75	22.25	23.25	23.50	23.50	24.00	24.00	24.00	23.50	22.50	22.00
1984	20.50	17.50	17.00	17.75	17.75	17.50	17.50	17.50	17.50	16.00	15.50	15.25
1985	15.00	15.00	15.00	14.25	15.00	15.00	15.75	16.00	16.00	16.50	16.75	17.00
1986	17.00	17.00	17.25	17.25	17.00	17.00	17.00	17.00	17.00	17.00	16.75	16.75
1987	16.65	16.75	17.00	17.00	17.00	16.90	16.75	16.65	16.65	16.75	16.65	16.55
1988	16.30	16.15	15.90	15.75	15.40	15.10	14.75	14.15	13.75	13.15	12.50	11.75
1989	11.60	11.20	10.70	10.10	9.85	9.80	9.80	9.70	9.60	9.40	9.20	9.00
1990	8.85	8.70	8.80	8.80	9.25	11.60	**11.70**					

US PREMIUM (Relative to the Exchange Value)

Determined as of the last day of the month indicated ($US/lb U_3O_8)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1986	—	—	—	—	—	—	—	—	—	—	0.65	0.75
1987	0.85	1.00	1.50	1.50	0.90	0.60	2.50	2.35	2.10	1.65	0.85	0.65
1988	0.70	0.50	0.15	0.25	0.60	0.00	0.00	0.00	0.00	0.00	**Discontinued**	

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HISTORICAL MARKET DATA

UF6 VALUES

Determined as of the last day of the month indicated ($US/kg U as UF_6)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1985	—	—	—	40.50	42.50	42.50	44.00	44.50	44.50	46.00	46.00	47.00
1986	47.00	48.00	48.00	48.50	48.25	48.25	48.25	48.00	48.00	48.00	48.00	47.75
1987	47.75	48.00	48.00	48.00	47.75	47.75	47.50	47.00	46.75	47.00	47.00	47.00
1988	46.50	46.00	45.50	45.25	44.75	44.00	42.75	41.00	40.75	39.00	37.50	35.50
1989	34.75	34.00	33.00	30.50	30.25	30.25	30.00	29.75	29.75	28.25	27.75	26.50
1990	25.90	25.25	24.40	24.40	25.50	32.00	**32.50**					

US UF6 PREMIUM (Relative to the UF6 Value)

Determined as of the last day of the month indicated ($US/kg U as UF_6)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1986	—	—	—	—	—	—	—	—	—	—	2.50	2.50
1987	2.50	2.50	3.50	3.00	2.25	1.75	6.50	6.00	4.25	3.10	2.25	2.00
1988	1.25	1.25	0.50	0.50	1.00	0.00	0.00	0.00	0.00	0.00	**Discontinued**	

TRANSACTION VALUES

Determined as of the last day of the month indicated ($US/lb U_3O_8)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1976	—	—	—	—	39.60	39.70	39.70	40.40	40.30	40.60	40.70	40.70
1977	41.30	41.30	41.40	41.50	42.80	42.90	43.00	42.60	42.50	42.80	42.90	42.90
1978	43.10	43.30	43.70	43.60	43.60	43.20	43.30	43.40	43.40	43.60	43.40	43.70
1979	43.60	43.80	43.70	43.40	43.60	43.70	43.70	43.60	43.60	43.60	43.50	42.30
1980	42.00	39.30	38.60	38.40	37.90	37.60	37.30	31.60	30.60	29.00	28.70	27.70
1981	27.20	27.20	27.00	25.70	25.70	24.50	24.40	24.30	23.90	24.10	24.10	24.00
1982	24.00	23.70	23.40	22.60	22.70	21.50	20.30	19.10	17.30	17.00	17.55	18.80
1983	19.35	20.00	21.35	21.40	22.35	22.45	23.50	23.60	23.65	23.65	23.85	23.85
1984	23.05	22.50	19.25	17.90	17.00	16.50	16.60	16.40	16.55	16.05	15.90	15.90
1985	16.20	15.70	15.05	14.90	14.45	14.60	14.75	15.10	15.10	15.75	15.80	16.55
1986	16.55	16.70	16.70	17.10	17.15	17.20	17.50	17.45	17.35	17.25	17.30	17.35
1987	17.35	16.90	16.95	17.00	17.20	17.10	17.30	17.55	18.20	18.05	17.80	17.20
1988	16.85	16.65	16.55	16.45	16.10	15.80	15.45	15.00	14.50	14.40	13.30	12.50
1989	12.25	12.00	11.25	11.00	10.75	10.45	9.95	9.80	9.80	9.65	9.55	9.40
1990	9.25	9.05	8.75	8.65	8.55	8.80	**9.75**					

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LOAN RATES

Determined as of the last day of the month indicated (Percent per Annum)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1968	—	—	—	—	—	—	—	4.00	4.00	4.00	4.00	4.00
1969	4.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	6.00	6.00	6.00	6.00
1970	6.00	6.20	6.40	6.50	6.50	6.50	6.50	5.00	6.50	6.00	5.50	5.50
1971	5.00	4.75	4.75	4.75	5.00	5.25	5.25	5.25	5.25	5.25	4.50	4.50
1972	4.00	4.00	4.00	4.50	4.50	4.50	5.00	5.00	5.00	5.00	5.00	5.00
1973	5.50	5.50	5.75	5.75	6.00	6.25	7.00	7.00	7.00	7.00	7.50	8.00
1974	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
1975	8.00	7.00	7.00	7.00	7.00	6.50	6.50	6.50	6.50	6.50	6.50	6.50
1976	6.50	6.50	6.50	6.50	*	*	*	*	*	*	*	*
1977	*	*	*	*	6.50	6.50	6.50	6.75	7.25	7.25	7.25	7.25
1978	7.25	7.00	7.00	7.00	7.00	7.50	7.75	7.75	7.75	7.00	7.00	7.00
1979	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1980	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1981	7.00	7.00	7.00	7.00	7.00	5.50	5.50	5.50	5.50	6.00	6.00	6.00
1982	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
1983	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
1984	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
1985	6.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
1986	5.00	5.00	5.00	5.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1987	3.00	3.00	3.00	3.00	3.00	3.00	3.00	4.00	4.00	4.00	3.50	3.50
1988	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1989	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1990	3.50	3.50	3.50	3.50	3.50	3.50	**3.50**					

* Float with Prime Rate

CONVERSION VALUES

Determined as of the last day of the month indicated ($US/lb U as UF_6)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1981	1.20	1.20	1.20	1.40	1.15	1.15	1.15	1.10	1.10	1.10	1.20	1.20
1982	1.20	1.20	1.20	1.20	1.00	1.00	1.00	0.90	1.10	1.60	1.45	1.45
1983	1.20	1.40	1.40	1.20	1.20	1.20	1.10	1.10	1.00	0.60	0.60	0.60
1984	0.60	0.30	0.80	0.80	0.80	0.00	0.00	0.80	1.00	1.00	0.80	0.80
1985	1.00	1.00	1.00	1.50	1.50	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1986	1.60	1.80	1.90	1.80	1.80	1.80	1.80	1.90	1.90	1.90	1.80	1.80
1987	1.80	1.80	1.80	1.80	1.80	1.80	1.90	1.90	1.90	1.90	1.90	1.90
1988	1.90	1.80	1.80	1.80	1.80	1.80	1.85	1.95	1.95	1.95	1.95	1.95
1989	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.90	1.90	1.80	1.75	1.65
1990	1.50	1.50	1.45	1.45	1.45	1.45	**1.45**					

SWU VALUES

Determined as of the last day of the month indicated ($US per SWU)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1986	80	80	80	80	75	78	78	78	78	78	80	80
1987	80	80	77	77	75	73	75	75	73	69	73	73
1988	73	73	70	68	68	68	68	65	65	65	65	65
1989	65	67	67	67	66	66	66	65	63	59	57	54
1990	54	50	50	50	50	50	**50**					

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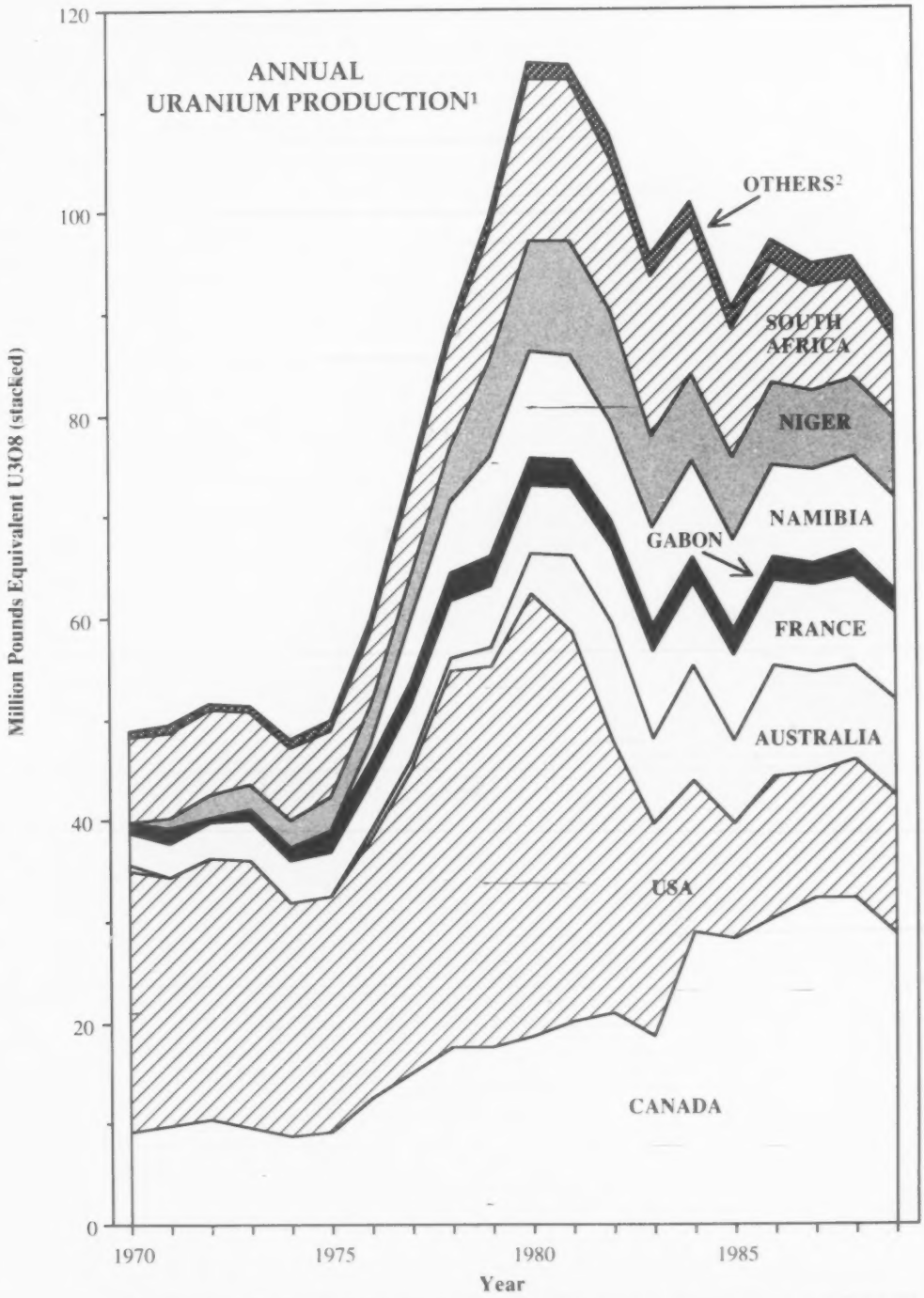
HISTORICAL MARKET DATA



[1] Estimated world production in 1989 totalled 89.6 million pounds (Australia—9.5; Canada—28.7; France—8.5; Gabon—2.2; Namibia—9.2; Niger—7.7; South Africa—7.7; USA—13.7; Others[2]—2.3).

[2] **Others** includes: Argentina, Belgium, Brazil, India, Pakistan, Portugal, Spain, West Germany and Yugoslavia

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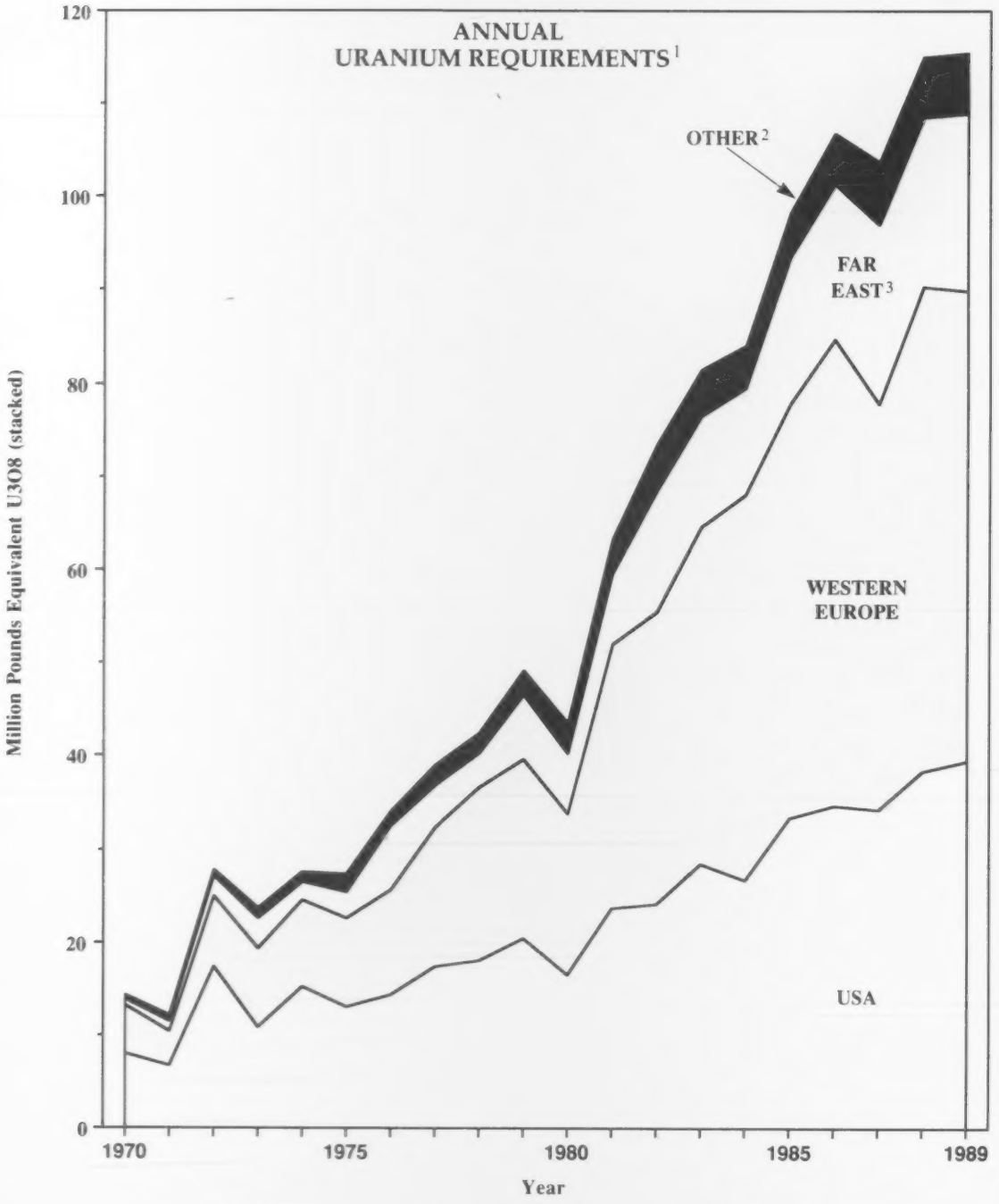

[1] Calculated by NUEXCO based on actual completion dates and operating performance, and NUEXCO's estimate of enriching tails assays.

[2] **Other** include: Argentina, Brazil, Canada, India, Mexico, Pakistan and South Africa.

[3] Does not include Peoples Republic of China.

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GOVERNMENT STATISTICS

AUSTRALIA

Year	Period [1]	Consumer Price Index [2] (1980/1981 = 100)	Price Index of Materials Used in Manufacturing Industry — All Groups [3] (1984/1985 = 100)	Average Weekly Ordinary Time Earnings — Adult Males — Australia [4] (Australian dollars)	Award Rates of Pay Indexes Australia - Adult Males In Mining Wage Earners, Weekly Rates [5] (June 1985=100)
1980	Avg.	95.8	83.1	—	140.8 [6]
1981	Avg.	105.0	85.9	—	154.1 [6]
1982	Avg.	116.7	89.0	—	174.9 [6]
1983	Avg.	128.5	96.9	—	181.9 [6]
1984	Avg.	133.6	98.0	—	194.4 [6]
1985	Avg.	142.6	107.3	—	103.7
1986	Avg.	155.5	101.5	—	106.1
1987	Avg.	168.7	108.9	465.88	112.3
1988	Avg.	180.9	111.8	496.90	115.2
1989	Avg.	194.6	117.0	534.65	126.0
Jan	1989	—	110.6	—	123.3
Feb	1989	—	111.2	521.90	123.4
Mar	1989	188.0	114.9	—	125.0
Apr	1989	—	117.5	—	125.4
May	1989	—	118.6	530.40	125.6
June	1989	192.6	119.9	—	125.8
July	1989	—	120.1	—	126.9
Aug	1989	—	119.2	539.30	127.0
Sept	1989	197.0	117.7	—	127.1
Oct	1989	—	117.8	—	127.3
Nov	1989	—	118.0	547.60	127.7R
Dec	1989	200.7	118.2	—	128.0
Jan	1990	—	119.2	—	128.0
Feb	1990	—	120.8	—	128.0
Mar	1990	204.1	121.5	—	128.2
Apr	1990	—	119.9	—	128.5
May	1990	—	118.9		128.7

P = Preliminary **R** = Revised since last month

[1] Monthly data for the period 1967 to 1986 appears in Report 233 (January 1988).
[2] Weighted average of six State capital cities (1975 to 1980), and eight capital cities from 1981 (Base: Financial year July 1980 to June 1981 =100.0). Figures shown at end of quarter represent quarterly average.
[3] Australian Bureau of Statistics, Canberra: "Price Index of Materials Used in Manufacturing Industry" (Catalogue No. 6411.0).
[4] Australian Bureau of Statistics, Canberra: "Award Rates of Pay Indexes, Australia" (Catalogue No. 6312.0). Figures for the latest fourteen months shown are subject to revision.
[5] Australian Bureau of Statistics, Canberra: "Average Weekly Earnings, States & Australia" (Catalogue No. 6302.0).
[6] Base: June 1976 = 100.

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CANADA

		Industrial Products Price Index: All Commodities[1] (1981 = 100)	Consumer Price Index: All Items (1986 = 100)[2]	Wage-earner Data: Average Hourly Earnings (C$)[3] Uranium Mines (SIC 057)	Metal Mines (SIC 051-059)	Mines, Quarries and Oil Wells (SIC 051-099)	Metal Rolling, Casting and Extruding (SIC 298)	Chemicals and Chemical Products Industries (SIC 372-379)
1980	Avg.	90.7	67.1	—	—	—	—	—
1981	Avg.	100.0	75.5	—	—	—	—	—
1982	Avg.	106.7	83.7	—	—	—	—	—
1983	Avg.	110.4	88.5	17.22	—	14.18	10.67	11.10
1984	Avg.	115.4	92.3	17.89	—	14.97	11.11	11.68
1985	Avg.	118.6	96.0	18.53	16.48	15.56	11.85	12.12
1986	Avg.	119.6	100.0	19.38	16.70	15.76	12.28	12.58
1987	Avg.	122.7	104.4	20.12	17.15	16.11	12.58	13.20
1988	Avg.	128.1	108.6	20.91	18.51	16.95	13.17	13.77
1989	Avg.	131.1	114.0	21.97	20.02	18.41	13.71	14.16
Jan	1989	130.7	110.8	21.22	19.45	18.14	13.75	13.82
Feb	1989	130.8	111.6	22.05	19.51	18.26	13.79	13.89
Mar	1989	131.3	112.1	21.90	19.65	18.35	13.62	14.10
Apr	1989	131.3	112.5	22.37	19.80	18.40	13.57	14.16
May	1989	131.4	113.6	21.89	20.02	18.17	13.76	14.27
June	1989	131.5	114.2	21.89	20.02	18.17	13.76	13.22
July	1989	131.4	115.0	21.67	19.60	17.96	13.57	12.98
Aug	1989	131.3	115.1	20.97	19.76	18.24	13.52	14.30
Sept	1989	131.0	115.2	21.97	20.61	18.73	13.68	14.83
Oct	1989	130.8	115.7	22.26	20.71	18.74	13.99	14.77
Nov	1989	130.8	116.0	22.60	20.64	18.78	13.93	14.75
Dec	1989	130.4	116.0	22.80	20.50	18.93	13.62	14.77
Jan	1990	130.8R	116.9	21.88	20.39	19.03	13.99	14.78
Feb	1990	131.6	117.6	22.51	20.63	19.14	14.49	15.03
Mar	1990	131.5R	118.0	22.52	20.75	19.17	14.99	15.07
Apr	1990	131.3R	118.1	23.17R	21.20R	19.46R	14.83R	14.93R
May	1990	131.8	118.7	23.28P	20.35P	18.94P	14.54P	15.10P
June	1990	131.7	119.2	—	—	—	—	—

P = Preliminary **R** = Revised since last month

[1] Statistics Canada, Prices Division, Ottawa: "Industry Price Indexes" (Catalogue 62-011). Indexes for the most recent six months shown are subject to revision. This category was formerly known as "Manufacturing." Monthly data for the period 1967 to 1986 is found in Report 233.

[2] New Base Year of 1986, as of Report 264. Previous Base Year was 1981. All figures in column recalculated by 0.755 multiplier .

[3] Statistics Canada, Labour Division, Employment and Payrolls Section, Ottawa: "Employment, Earnings and Hours." Monthly data for the period 1983 to 1986 is found in Report 233.

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GOVERNMENT STATISTICS

SOUTH AFRICA

		Average Declared Working Costs per Metric Ton of Gold Ore Milled[1] (Rand)	Tonnage-Weighted Index of Average Working Costs per Metric Ton of Gold Ore Milled[2] (March 1982 = 100)	Consumer Price Index[3] (1985 = 100)	Production Price Index All Groups[4] (1985 = 100)	Total Employment in Mining and Quarrying[5]	Total Salaries and Wages in Mining and Quarrying[5] (1,000 Rand)
							Annual Total[6]
1980	Avg.	35.53	—	51.9	55.2	709,042	2,237,689
1981	Avg.	41.89	—	59.8	62.7	722,918	2,756,928
1982	Avg.	47.25	104.2	68.6	71.4	70[illegible]41	3,181,584
1983	Avg.	51.88	115.0	77.1	79.0	700,901	3,563,282
1984	Avg.	58.95	130.3	86.0	85.6	711,511	4,134,390
1985	Avg.	68.76	151.6	100.0	100.0	724,587	4,778,612
1986	Avg.	80.22	177.9	118.6	119.5	756,637	5,767,950
1987	Avg.	95.01	223.1	137.7	136.2	751,864	6,911,395
1988	Avg.	106.69	241.1	155.4	154.1	705,355	7,774,054
1989	Avg.	116.65	273.0	178.2	177.5	700,360	8,833,934R
							Monthly Total
Jan	1989	—	—	166.8	165.5	714,593	704,320
Feb	1989	—	—	168.2	168.5	696,329	669,983
Mar	1989	112.29	262.8	170.9	171.1	702,746	695,843
Apr	1989	—	—	173.1	173.8	658,677	634,344
May	1989	—	—	175.9	176.4	706,056	721,263
June	1989	113.76	267.0	177.7	177.1	706,810	720,586
July	1989	—	—	179.3	178.8	711,648	775,002
Aug	1989	—	—	181.8	180.7	703,812	793,475
Sept	1989	119.76	280.2	183.4	181.7	708,222	780,723
Oct	1989	—	—	185.1	183.9	689,017	737,718R
Nov	1989	—	—	187.0	185.6	704,025	790,375
Dec	1989	120.79	282.0	189.4	187.2	702,382	810,302
Jan	1990	—	—	192.0	188.8	688,837	801,616
Feb	1990	—	—	193.3	190.3	674,026	767,274
Mar	1990	126.74	296.3	196.4	190.9	684,251	762,303
Apr	1990	—	—	198.3	194.1R	696,107	810,474
May	1990	—	—	200.4	196.3	—	—
June	1990	128.25	299.87	201.8	—	—	—

P = Preliminary **R** = Revised since last month

[1]Chamber of Mines of South Africa, Johannesburg: "Analysis of Working Results," published quarterly. Historical Data by month appears in Report 236.
[2]Page 16 of Report 178 contains description and calculation of index, and page 24 of Report 178 lists figures for 1982.
[3]Central Statistical Service, Pretoria: All income groups-weighted average, Historical Data by month appears in Report 236.
[4]Central Statistical Service, Pretoria: All commodities for consumption in South Africa.
[5]Central Statistical Service, Pretoria: Historical Data by month appears in Report 236.
[6]Annual total is shown, rather than monthly average for indicated year.

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UNITED STATES

		Producer Price Index[1]		Consumer Price Index[2]	GNP Implicit Price Deflator[3]	Gross Average Hourly Earnings of Production or Non-supervisory Workers (US$)[4]			
		Industrial Commodities (1982 = 100)	All Commodities (1982 = 100)	(1982-1984 = 100)	(1982 = 100)	Metal Mining (SIC 10)	Primary Non-ferrous Metals (SIC 333)	Chemicals and Allied Products (SIC 28)	Electric and Electronic Equipment (SIC 36)
1980	Avg.	88.0	89.8	82.4	85.7	10.26	10.63	8.30	6.94
1981	Avg.	97.4	98.0	90.9	94.0	11.55	11.98	9.12	7.62
1982	Avg.	100.0	100.0	96.5	100.0	12.31	12.93	9.96	8.21
1983	Avg.	101.1	101.3	99.6	103.9	12.58	13.43	10.58	8.67
1984	Avg.	103.3	103.7	103.9	107.7	13.05	13.43	11.07	9.04
1985	Avg.	103.7	103.2	107.6	110.9	13.38	13.74	11.56	9.46
1986	Avg.	100.0	100.2	109.6	113.9	12.46	13.48	11.98	9.65
1987	Avg.	102.6	102.8	113.6	117.7	12.52	12.98	12.37	9.88
1988	Avg.	106.3	106.9	118.3	121.7	13.09	13.22	12.67	10.13
1989	Avg.	111.6	112.2	124.0	126.6	13.67	13.75	13.06	10.38
Jan	1989	109.4	110.5	121.1	—	13.80	13.49	12.85	10.27
Feb	1989	110.1	110.8	121.6	—	13.66	13.48	12.88	10.26
Mar	1989	110.5	111.5	122.3	125.4	13.71	13.51	12.91	10.30
Apr	1989	111.8	112.3	123.1	—	13.68	13.65	12.92	10.31
May	1989	112.1	113.2	123.8	—	13.60	13.57	12.98	10.33
June	1989	112.4	112.9	124.1	126.0	13.62	13.66	12.98	10.37
July	1989	112.2	112.8	124.4	—	13.70	13.75	13.12	10.41
Aug	1989	111.4	112.0	124.6	—	13.64	13.72	13.08	10.40
Sept	1989	111.9	112.4	125.0	126.8	13.70	13.99	13.18	10.47
Oct	1989	112.4	112.8	125.6	—	13.76	13.94	13.25	10.43
Nov	1989	112.2	112.7	125.9	—	13.69	14.12	13.26	10.47
Dec	1989	112.3	113.0	126.1	128.0	13.51	14.16	13.31	10.52
Jan	1990	114.1	114.9	127.4	—	13.75	13.95	13.31	10.50
Feb	1990	113.6	114.4	128.0	—	13.75	13.98	13.24	10.54
Mar	1990	113.2	114.2	128.7	129.7	13.85	14.04	13.30	10.58
Apr	1990	113.1	114.0	128.9	—	13.91R	14.32R	13.49R	10.58
May	1990	113.3	114.5	129.2		13.94P	14.15P	13.42R	10.62R
June	1990	113.1	114.2	129.9	130.9			13.46P	10.68P

P = Preliminary **R** = Revised since last month

[1]US Bureau of Labor Statistics, Washington, D.C.: "Producer Prices and Price Indexes," (formerly "Wholesale Prices and Price Indexes"). Producer Price Indexes are revised four months after they are first released to reflect the availability of late reports and corrections by respondents. Historical data is presented in Report 233.

[2]US Bureau of Labor Statistics, Washington, D.C.: Consumer Price Index for All Urban Consumers, US City Average, All Items. Historical data is presented in Report 233.

[3]US Department of Commerce, Washington, D.C.: Bureau of Economic Analysis, National Income and Wealth Division: "Survey of Current Business." The GNP Implicit Price Deflator is published quarterly, and seasonally adjusted. Historical data is presented in Report 233.

[4]US Bureau of Labor Statistics, Washington, D.C.: "Employment and Earnings." All data based on 1972 revision of SIC Manual. Historical data is presented in Report 233.

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GOVERNMENT STATISTICS

VOLUME AND PRICE OF URANIUM DELIVERIES TO THE EUROPEAN COMMUNITY [1]
(Compiled from data published by the Euratom Supply Agency)

Year	Volume of Deliveries to the EC [2] (MTU)	Percentage of Deliveries Made Under Spot Contracts	Medium or Long-Term Contracts [3] Average Price		Spot Contracts [3] Average Price	
			in ECU per pound U_3O_8	in US Dollars per pound U_3O_8	in ECU per pound U_3O_8	in US Dollars per pound U_3O_8
1977	n/a	n/a	n/a	n/a	n/a	$41.00
1978	n/a	n/a	n/a	n/a	n/a	$43.00
1979	10,000	n/a	n/a	n/a	n/a	$44.50
1980	8,600	n/a	n/a	$36.00	n/a	$35.00
1981	13,000	less than 10	n/a	$33.25	n/a	$28.00
1982	12,500	less than 10	ECU 32.25	$32.00	ECU 24.25	$24.00
1983	13,500	less than 10	ECU 34.75	$31.00	ECU 26.00	$23.25
1984	11,000	less than 10	ECU 37.75	$29.75	ECU 24.50	$19.25
1985	11,000	11.5	ECU 38.00	$29.00	ECU 19.50	$15.00
1986	12,000	9.5	ECU 31.50	$31.00	ECU 18.00	$17.75
1987	14,000	17.0	ECU 28.25	$32.50	ECU 15.00	$17.25
1988	12,500	4.5	ECU 26.92	$31.82	ECU 13.65	$16.13
1989	13,500	11.5	ECU 26.63	$29.35	ECU 11.04	$12.19

R = Revised

[1] The twelve European Community member nations are Belgium, Denmark, France, West Germany, Greece, Ireland, Italy, Luxembourg, The Netherlands, Portugal, Spain, and the United Kingdom; prior to January 1986, Spain and Portugal were not members of the EEC.

[2] The only deliveries taken into account are those made to final users, namely the electric utilities or their procurement organizations; deliveries to middlemen or fuel cycle companies are not included. The sales between utilities in the Community are also excluded. The quantities covered are those which were entered into accounting records during the year stated.

[3] For deliveries made under medium or long-term contracts (i.e., for which the time between the date of signature and the date of the last delivery exceeds one year) the prices were expressed in seven different currencies. In order to calculate an average price, these prices have been converted into European Currency Units (ECU) and US dollars. The average prices were weighted by quantity and converted on the basis of the average annual exchange rate of the different currencies against the ECU and US dollar. Exchange rates are published by European Communities Statistical Office and the International Monetary Fund.

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US URANIUM MARKETING ACTIVITIES STATISTICS
(Compiled from data published by the US Energy Information Administration) [1]

Year	Total Production (million pounds U_3O_8)	Deliveries to Domestic Utilities From US Suppliers[2] (million pounds U_3O_8)	Average Price of Delivered Uranium[2] ($/lb. U_3O_8)	Quantity of Uranium Imported[3] (million pounds U_3O_8)	Average Price of Imported Uranium ($/lb. U_3O_8)	Quantity of Uranium Exported (million pounds U_3O_8)
1976	25.5	27.6	$16.10	3.6	n/a	1.2
1977	29.9	27.8	$19.75	5.6	n/a	4.0
1978	37.0	31.6	$21.60	5.2	n/a	6.8
1979	37.5	33.0	$23.85	3.0	n/a	6.2
1980	43.7	35.0	$28.15	3.6	$43.10	5.8
1981	38.5	32.6	$34.65	6.6	$32.90	4.4
1982	26.9	23.5	$38.37	17.1	$25.19	6.2
1983	21.2	24.2	$38.21	8.2	$26.16	3.3
1984	14.9	22.5	$32.65	12.5	$21.86	2.2
1985	11.3	21.7	$31.43	11.7	$20.08	5.3
1986	13.5	18.9	$30.01	13.5	$20.07	1.6
1987	13.0	20.8	$27.37	14.8	$19.14	1.0
1988	13.1	17.6	$25.65	15.8	$19.03	3.3

[1] Sources: 1976-1983: US Department of Energy/Energy Information Administration, *Survey of United States Marketing Activity*
1984-1988: Energy Information Administration, *Uranium Industry Annual*
[2] Data for 1976-1981 includes both domestic utilities and agents
[3] Includes imports by domestic utilities and domestic suppliers

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